

Santa Monica College
Technology Plan
2000-2005

Updated regularly at <http://www.smc.edu/techplanning>

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1. Introduction

Santa Monica College is committed to providing access to technology and to using technology effectively to reach its goals. The Technology Plan describes the processes and guiding principles that are used to determine which new technologies to adopt, how to maintain existing technologies, and how to plan for the impact of those technologies on SMC's human, financial, and physical resources. The rapid changes in information technology coupled with annual variations in state funding for technology necessitate frequent updates to each year's technology objectives. Thus, this plan is best viewed as a living document, the current version residing at <http://www.smc.edu/techplanning>. Readers of hardcopy versions should recognize that the information therein might be out of date.

1.1. Summary of Progress to Date

The first *Master Plan for Technology* effectively guided Santa Monica College from a "technology challenged" status in 1996 to a statewide leadership position in the use of technology by 2000. Creative use of a combination of varied funding sources enabled an implementation effort through which all major objectives of the plan were accomplished

Particular attention was paid to academic computing support, arguably the area that had suffered most from neglect prior to the implementation of this plan. Between 1996 and 2000, twenty-six instructional computing labs were created or substantially updated, some more than once. The Library implemented a new computer access system to enable Internet access to library records, upgraded student access computers in the reference area, replaced staff terminals with personal computers, and increased the number of electronic database subscriptions and made them available through remote access. The Faculty/Staff Computer Lab was expanded and upgraded to include multimedia development as well as e-mail and Internet access. Computers were provided to every academic department, and a program to provide computers to individual faculty members was initiated. (By July 2000, 103 individual faculty computers had been installed.) The Virtual Office Hours function was expanded and enhanced, and the College's web server boasted about 200 active faculty homepages by July 2000. Enhancements in classroom technology ranged from the purchase of eleven Educarts (with whiteboard and web-learning capabilities) for use in older classrooms to the "wired" classrooms in the new Science building, featuring computerized multimedia presentation systems in every classroom and laboratory. Videoconferencing became a reality through the installation of a V-Tel system at the Academy of Entertainment and Technology and a PictureTel system housed in the Media Center. Distance education arrived on the scene in Fall 1998 with the offering of a single course section. By Spring 2000, eighteen online course sections were scheduled.

In the arena of administrative and student services computing, Windows NT network services were implemented for the entire campus, and departmental file servers were installed in Financial Aid, Community Services, Business Services, and Maintenance. Electronic communication quickly became primary as Microsoft Exchange e-mail services were implemented for both staff and students. All central servers, including those for Internet, Intranet, Faculty/Staff E-Mail, network printers, and NT network services, were upgraded. The EPOS telephone student registration system was implemented, and implementation of web-based student application, admission, registration, and Associate in Arts Degree audit services was begun, along with a document imaging system to support student services. A digitized campus ID card system was put into place, and technology support functions for Workforce and Economic Development were initiated. The ISIS system was upgraded to Oracle 2000, server hardware was upgraded, and the MIS infrastructure was redesigned. (Training and infrastructure preparation had also occurred for the PeopleSoft implementation which was eventually put "on hold" to allow for the much needed development and implementation of the previously mentioned web-based student

services functions.) Concurrently with all of this, Y2K compliance activities were successfully completed.

Appropriate attention was devoted to technology infrastructure to allow support of over 1000 new computers, 800 new telephones, and seven new or remodeled facilities. The network infrastructure was upgraded to an ATM network, increasing its capacity from 300 to 1300 workstations. Remote dial-in access was enabled, and a security firewall system was installed for the campus network. A network management system for easier troubleshooting and faster resolution of problems was implemented, a Nextel radio system was installed, the Business Building network was upgraded to gigabit Ethernet technology for increased capacity, and high-speed DSL remote access was enabled for college staff.

Through the Director, Technology Training position (funded by the Chancellor's Office Telecommunications and Technology Infrastructure Program Grant), the College implemented a multi-tiered technology training plan. Employees were provided access to technology workshops, semester-long courses, and self-paced training software for all common Microsoft applications (Word, Excel, Access, PowerPoint, Outlook, FrontPage, etc.) The staff training lab was expanded and upgraded. Integration of accessible design principles into all SMC web authoring was begun through courses and workshops. Videoconferencing training was provided through V-Tel and PictureTel, and distance education training was provided through eCollege.com for faculty interested in developing online courses.

1.2. Funding

Funding for the technology plan is provided through a combination of District general and categorical resources. General funds provide IT staff compensation, supplies, maintenance contracts, and occasional equipment purchases. Most equipment and software is purchased with various categorical funds in accordance with the guidelines for the appropriate use of each. In recent years, the following programs have provided the majority of funding for tech plan purchases:

- Instructional Equipment Block Grants are usually allocated to the colleges by the state annually to support District needs for instructional equipment, including both technical and non-technical equipment needs for instructional programs and for the library.
- Vocational and Technical Education Act (VTEA) funds are allocated by the Federal government via the state. They are intended to support the development of occupational programs and may be used for technical and nontechnical needs. There is considerable uncertainty at the Federal level regarding the continuation of this program after 2003-2004.
- One-Time Technology Block grant funding was allocated by the state in fiscal year 2000-2001 to support District technology needs. It is typically reserved for critical IT needs that do not meet the use requirements associated with other categorical funds.
- Student ID Card sales generate revenues, a portion of which are set aside to support technology initiatives that directly benefit students in accordance with a formal agreement between the District and the Associated Student Government.
- The Associated Student Government (AS) collects revenues annually via the AS membership fee. The AS leadership develops its annual budget in consultation with the Student Services administration, frequently opting to invest in technology for student use. *ask Bobby—is this an accurate description?*

The District Technology Committee develops the annual technology budget. This committee is chaired by the Vice President responsible for Information Technology and is comprised of faculty, administrators, classified staff, and a student representative. Each year, this committee receives input about the College's current technology needs from four primary sources:

- The Academic Senate Joint Information Services Committee (ISC) solicits requests for new or replacement instructional technology annually from individual departments and programs.

The requests are prioritized by ISC members, then forwarded to the District Technology Committee.

- Student Services administration collects and prioritized noninstructional technology needs for student service departments. Their top priority needs are also forwarded to the District Technology Committee.
- Leaders of the various Information Technology departments provide input regarding special projects, upgrades to existing systems, and other system and infrastructure maintenance needs that are not included in their regular departmental budgets.
- Leaders of academic departments or programs with vocational offerings are eligible to submit proposals internally to compete for VTEA (Vocational and Technical Education Act) funding each spring. The VTEA committee reviews the proposals and allocates the VTEA funds accordingly. Beginning, in 2002-2003, those initiatives that relate to information technology are incorporated into the Technology Plan annual objectives.

The District Technology Committee allocates the available funding based upon the following principles:

- Maintaining existing technologies is generally given higher priority than expansion or implementation of new initiatives. Examples include replacing or upgrading computers that can no longer run essential software; maintaining service contracts and software licenses on essential services such as instructional applications, the Integrated School Information System (ISIS), email, Microsoft office, Internet security and antiviral systems; and maintaining and upgrading the campus network in keeping with expanding usage.
- New initiatives are evaluated based upon their potential positive impact upon SMC student learning and upon feasibility issues related to user readiness, availability of necessary facilities and staffing, and other indirect costs of implementation.
- When categorical funds are allocated, appropriate use guidelines tied to those funds are, of course, honored.

1.3. The Total Cost of Ownership Model

A key component of this technology plan is the recognition and inclusion of the total cost of ownership (TCO) of new technologies in all stages of planning and implementation. To accurately project the impact of additional or new technology, it is critical to consider, over and above the initial cost of any equipment or software, the costs of:

- Changes to physical space necessary for new or additional technology to operate properly. This includes changes to the space in which the technology is to be housed such as moving, removing or adding walls; additional electrical or data equipment or wiring required; and additional loads on existing air conditioning systems. Change in space usage must be reported to Facilities for the state space inventory. Adherence to fire, life safety and building codes is required.
- equipment to ensure that student facilities are accessible to disabled users, including the adjustable height tables and large monitors.
- Additional network infrastructure necessary to support new or additional technology such as servers, switches, hubs, ports, and IP addresses.
- Additional staff to support new or additional technology including lab staff for student labs, tech support for college staff, network staff to support the additional impact on the infrastructure, staff to maintain and repair equipment, and user training staff. If existing staff are to assume additional duties, the impact on workload, turn around time and scheduling must be addressed. The cost of staff time to clean out, upgrade and re-image computers for cascading should be considered when calculating the savings and costs of cascading.
- Expansion of existing software licenses. Needs range from additional users of the Microsoft Office suite to specialized software needed for instruction. College-wide licenses cannot absorb additional users at no cost.

- Maintenance and repair. Additional technology increases energy consumption, which must be projected. Additional equipment must also be repaired and maintained, generating staffing issues as discussed above.

1.4. Growth

Santa Monica College has experienced tremendous growth over the past decade. The main campus operates at full capacity, including significant use on evenings, weekends, and intersessions. The college has expanded further by utilizing a number of satellite locations including the Madison campus, the Academy of Entertainment Technology, the administration complex at 2714 Pico Boulevard, and the Emeritus College site, and others. Long-term facilities plans include additional decentralization as a new satellite campus is developed at the former BAE site purchased in 2002. It is critical to all campus planning efforts, including technology planning, that all the implications of our multi-site composition be considered. Preserving an effective level of technical support for users at remote sites is the greatest of the challenges for IT. Technical support staff who serve the entire college community are generally located on the main campus. To provide support to remote locations requires time for travel and access to parking at the remote facilities. Thus, response times when technical failures interrupt classes or other important college business is necessarily longer for users at remote sites. If support needs are heavy at a satellite location, it is probably necessary to provide local support staff.

1.5. Accessibility to Disabled Users

SMC is committed to fulfilling its legal and ethical obligation to provide equal access to electronic and information technology (E&IT) to all students and employees including those with disabilities. Consistent with this commitment, we are integrating into this technology plan; universal access goals based upon current accessibility standards for software, web pages, telecommunications products, video and multimedia products, self-contained closed products, as well as desktop and portable computers. The current federal standards are those delineated in the 1998 revision to Section 508 of the 1973 Rehabilitation Act. California Assembly Bill 105, which went into effect January 1, 2002, mandates compliance with Section 508 standards for any purchases made with state funds. Recognizing both the importance of compliance with 508 standards and the fiscal constraints that preclude hiring a 508 coordinator, the Academic Senate Information Services Committee (ISC) is forming a subcommittee to address Section 508. The tentative goals include drafting administrative regulations for complying with laws on equal access to E&IT, evaluating our current level of 508 compliance and developing a plan for compliance including achievable, prioritized goals.

Providing universal access to E&IT requires the cooperation of many campus programs, primary among which are Disabled Student Services, Academic Computing, Management Information Services, and the Media Center. The Disabled Student Services High Tech Training Center (HTTC) is dedicated to ensuring that all students with disabilities in academic courses and all SMC employees have equal access to E&IT. Towards this end, the HTTC provides access evaluations, training in assistive technology, computer courses, and consultation to the campus community on all aspects of universal technology access. Universal access to mainstream campus labs is provided through the Campus-Wide Assistive Technology Plan (CWATP). The CWATP was passed by the Academic Senate and incorporated into the Master Plan for Technology during the spring of 1998. This plan established a philosophical and operational foundation for distributed access to assistive technology, ergonomic equipment, and adjustable furniture. Each year the ISC and the District Technology Committee funds a budget for campus-wide assistive technology for provision of assistive technology in mainstream labs.

2. Goals for Information Technology Services

The following paragraphs summarize both the goals for and the current status of the primary services provided to the campus community by the IT departments. Detailed information about each is provided in Appendix H.

2.1. Email

The use of -- and therefore, the computing and staffing resources devoted to -- e-mail at SMC has grown substantially over the last several years. E-mail is convenient, self-documenting, and often the most efficient way to communicate. The College has already come to rely on the service for conducting its day-to-day operations including instruction, administrative services, student services, and individual correspondence. The long-term goal is for the college email system to be the official method of communication for both employees and students in order to reduce the consumption of paper and toner, and to eliminate the redundancy currently faced by SMC employees who must prepare campus communications in both email and hardcopy formats.

The faculty/staff e-mail system is comprised of nearly 2,500 electronic mailboxes, with nearly 300 distribution groups covering over 100 academic departments and campus service areas. The system runs on a single Microsoft Exchange 2000 server, within a multi-site Windows 2000 Active Directory domain environment. The e-mail server hardware has been wholly upgraded three times in the last five years, while the software's migration path began from Exchange 5.0, through Exchange 5.5, and eventually to Exchange 2000. The server also acts as a relay for other email-driven services for the campus Web servers, Enrollment Services, the International Students Center, and the Financial Aid department, among others.

The student e-mail system serves over 30,000 student mailboxes using Ipswitch IMail 7.15 e-mail software, which is a highly scalable POP3 service with an independent customized web-access interface. Due to the number of enrolled students each semester, this service has been upgraded through several server hardware platforms and e-mail server software before the current IMail solution was implemented in 2001. An upgrade to IMail 8.0 is planned for Summer 2003.

The two e-mail systems act in concert to queue messages for delivery while the other system may be offline or otherwise busy. Each system routinely runs anti-virus software, scanning messages prior to delivery; because the systems are on different platforms, however, two different versions of the same anti-virus software must be run and updated independently. Budget permitting, it has been a long-time goal to establish a single e-mail gateway for both systems to handle message queuing and anti-virus scanning, as well as anti-spam filtering. Besides the benefit of consolidating services through such a "front end" server, users of the system would enjoy a noticeable enhancement in system performance and responsiveness.

A more immediate goal for improving the faculty/staff e-mail system is to expand the number of disks for the server's Information Store, thus allowing a higher diskspace quota per mailbox. Moreover, the additional diskspace would allow the Store itself to be divided into multiple storage groups for better messaging segregation, faster backup, and more efficient (staggered) maintenance schedules. There are currently no plans to upgrade to Microsoft Exchange 2003 server, as this would entail making significant changes to the domain and to other servers. Nevertheless, as additional collaborative and/or security features become available through new versions of e-mail software, further upgrades of the system hardware and/or software may become attractive, if not compelling.

2.2. Web Services

The term “web services” has two very different meanings, both of which are relevant to the technology planning efforts underway at SMC. In the technical world, web services is a very specific term referring to an emerging set of standards that enable various Internet-based software applications to work together seamlessly, exchanging data as needed via publicly-available application programming interfaces (API’s). For most SMC users, the term means making existing SMC services available over the Internet. To avoid confusion, we will use the technical definition of the term in this document. It should be understood that web services are just one of several technologies that could be used to provide SMC services over the Internet. It is, however, the emerging standard and, therefore, the option that SMC intends to use.

The ultimate, long-term goal of the web services initiative at SMC is to provide a computing environment possessing the following characteristics:

- **Single Sign-On:** Users will receive one login id and password that will provide access to all SMC services including the network, email, ISIS, eCollege, docuweb, and other Internet-based software purchased or licensed by SMC.
- **System Integration:** Various computing systems will be able to share data as needed without manual intervention by IT staff or users. For example, up-to-the-minute student enrollment data could be shared with eCollege or other learning management systems, need another popular/common example here—maybe a counseling need?
- **Anytime, Anyplace Access:** As SMC services migrate to the Internet, they become available to users 24 hours a day, 7 days a week, from any where the user has access to the Internet. The vast majority of SMC students and employees now have Internet access from home and will therefore be able to take full advantage of the expanded access.
- **Accessibility:** The Internet user interface developed for each online service is tested by the experts in SMC’s Disabled Student Services Program to be sure it is accessible to disabled users and compliant with relevant legislation.
- **User Specificity:** Information provided to users will vary depending upon that user’s role at the college. Active students will login to SMC’s homepage and see different information than a prospective student will see, for example. By tailoring the content to the user’s role, the overall website becomes easier to use as the range of available information is narrowed.

Although web services technology still has long way to go before all the anticipated functionalities are delivered by the industry, SMC has already adopted this open standard to deploy the most critical functions to our end users.

2.2.1. College Websites

SMC supports a number of complimentary web sites that together comprise our Internet presence, with the primary site residing at www.smc.edu. All SMC websites originally shared a common goal to provide SMC employees, students, and the surrounding community with anytime, anyplace access to information about the college and its many resources. More recently, this goal has been expanded tremendously to include providing anytime, anywhere access *to the college resources themselves*.

Providing static information online involves only the creation and maintenance of simple text and graphic based web pages, which can now be accomplished using common software applications that are not unlike word processors. At SMC, content management has therefore been decentralized to the individual departments, programs, and employees who wish to provide information to the community online. SMC employees have participated enthusiastically in technical training workshops on web page authoring and are now well equipped to write and update their own web content. The college Internet and Web Servers Coordinator delegates

permissions directly to SMC employees, enabling them access to their own folders on the college servers.

Two factors are now driving SMC away from this model. First is the rapidly expanding desire of departments to provide interactive, personalized services online. In most cases, this is a task requiring greater technical expertise and access to college databases than general users possess. Second is the tremendous growth in the number of pages, including a significant number of obsolete and/or redundant pages, currently available on the college websites. Ensuring that users are able to find current, relevant, and accurate information and resources quickly and easily is becoming increasingly challenging. A true solution will require a centralized system for content management.

An increasingly common solution to the problem of "information overload" is the use of a portal in which users are identified via a login procedure, then shown only that information and those services that are relevant to their role at the college. Visitors to the site would be greeted with information of general interest to the public and an opportunity to login. Those affiliated with SMC could login to see additional information and access additional resources. For example, an enrolled student might see, after login, a list of his or her enrolled classes, each linked to the class website; a personalized calendar for the day including scheduled classes, club meetings, counseling appointments, etc.; and information from enrollment services regarding enrollment status, fees due, etc.

There are many steps in the complex path to realizing this goal. Many of the first steps are those already underway in MIS and Network Services where the infrastructure for more data-driven interactive site and for integration of our network and ISIS accounts is being developed (see below). As the technology develops and the portal becomes a reality, services that are good candidates for online delivery will be evaluated and prioritized according to readiness, feasibility, and usefulness for users. Among those services to be developed will be a content management system to assist in the organization and maintenance of the wealth of public information available at www.smc.edu.

2.2.2. Administrative Tools

SMC administrative technology support adopted the Unix Operating System, Oracle Database, and Oracle Development Suites as the primary support environment in 1995. The open architecture technology was originally designed to support College business transactions and other administration functions, but quickly evolved into the centralized data/system integration center. The expectations for the administrative system now include not only the technology tools for the Student Services, Academic support, Human Resources, and internal Financial Services support systems, but also all the data integration points to meet the requirements of electronic messaging systems, file transfers, remote access, instructional computing labs, learning management systems, and data exchanges to and from external agencies. The need for self-service functionalities to provide all users with anytime, anyplace access via the Web has generated a major initiative to upgrade the administrative infrastructure to more performance oriented but cost effective hardware and software. After conducting an industry-wide availability and cost analysis and considering the existing staff technology skill set, the college decided to upgrade the support hardware from the out-performed Sun Microsystems equipment to a state-of-the-art HP/Storage center-based high performance system.

In 1998, the College purchased the PeopleSoft Administrative System to serve as the new software platform. However, the implementation project was put on hold at the end the 1999, primarily for two reasons: 1) Consensus from all involved parties that the PeopleSoft Student

Administration product was immature and lacking in critical functionality, and 2) The immediate need to provide self-service capability for students to conduct enrollment and other support service transactions online. A new plan was developed to expand the College's existing Oracle tools based in-house system (ISIS) to achieve the College's immediate goals, and to then reassess the feasibility of implementing PeopleSoft when the time is appropriate.

Since then, the MIS Department has utilized the full functionality offered by Oracle Database Server, Oracle Application Server, and Oracle Developer Suite to fulfill all administrative technology plan objectives, as well as requirements from granting agencies or from federal, state and county offices.

MIS established and continually updates a working project plan to lead the College administrative systems forward as new technical solutions become available and feasible to implement in our environment. The goals of the plan are summarized below. Please refer to the annual technology objectives for details.

2000-2001: Preparation and Migration

In parallel with the hardware upgrade effort, establish a plan to upgrade the ISIS development environment to the latest Oracle tools, Oracle Developer 6i, and convert all ISIS character based applications to graphical user interface and run College administrative system on a standardized browser interface within the College intranet.

The main benefit of this effort is to migrate the administrative environment to a high performance server-based open architecture to:

- Provide dynamic data-driven Internet self-service functionality, including web based reporting systems.
- Fully utilize existing browser standard capabilities and a user-friendly graphical interface.
- Reduce client maintenance costs.
- Enable the possibility for real time data integration and exchange among various systems and websites.

The primary projects to support this migration effort are:

- Evaluate partial outsourcing approaches that effectively use internal resource and maximize return on investment.
- Develop a feasible project plan to achieve the ultimate goal of supporting Internet self-serve functionality. Possibly stage the entire plan into three phases: upgrade hardware environment and operating system to achieve performance and optimize throughput of the new Internet based technology; migrate database and all software applications to current internet/intranet enabled versions; convert all existing applications from character mode to GUI based interface, and then enable all applications to run through an Intranet browser interface.
- Research and develop Internet self-service software applications based on specific goals and objectives.

2001-2002: New Development, Testing and Production

The skill set of the MIS staff has been updated and the system environment has become mature and stable in the first phase. Much new functionality is planned for implementation and will be put on production in this phase. In the meantime, many internal development standards are being formalized to increase productivity and ease future maintenance efforts. Most importantly, users are provided with a consistent look and feel throughout the various modules in the system, thereby increasing productivity for users.

A major component of this phase is close collaboration with the Technology Training team to create training curriculum that will effectively enable users to take full advantage of the capabilities of these new Internet-enabled tools.

The major development efforts for this phase are summarized as follows:

- Support the design and development of additional functions required by Enrollment Service to enhance student and faculty self-service and modernization technology plan.
- Support the design and development of the degree audit and transfer-readiness checking project initiated from Title III grant.
- Support the design and development for the Human Resources (HR) department in automating employment requests.
- Execute and fine-tune the new development standards to ensure overall system and operation efficiency and effectiveness.
- Develop an MIS staff training plan to prepare for the next major technology migration.

2002-2003: Maintenance and preparation for Upgrade

After all the major objectives on business improvement have been achieved and many core requirements are met, there would be heavy fine-tuning and maintenance efforts expected in this phase. However, with the speed of new Internet technology development, the effort will also need to be focused on preparing the administrative tools to the next generation of infrastructure.

The new Internet application infrastructure for the College will be supporting a Portal framework, which has been identified as the most efficient way to retrieve relevant data or information securely via the Internet through a common interface. It provides one single entry point for all necessary business interactions. Ideally, users will be able to conduct all daily business via one page within the SMC website. After one single valid login, the portal will determine and retrieve all relevant information by the user's identified access role.

The primary goals for this phase are to:

- Acquire sufficient hardware and updated operating systems to adequately support the development effort of this new technology infrastructure.
- Research and develop Oracle 9i Portal environment and migrate the WebISIS database to Oracle9i and the WebISIS user interface into the Oracle9i Portal environment.
- Strengthen internal processes and standards to consolidate duplication and enhance reusability to make these newly developed programs and procedures more efficient.
- Review and improve newly developed functions to further facilitate users' business processes, including all new development for the modernization of Student Services projects, and for the HR and Business departments' data integration requirements.
- Support the county PeopleSoft conversion project and ensure data format consistency between the county system and WebISIS.
- Plan and prepare for all necessary migration tasks required by the portal infrastructure conversion.

2003-2004: New Development, Testing and Production

The software application development phase starts when the initial research and development work for the Portal framework infrastructure is complete in the development environment. The development plan will include a timeframe and migration steps to upgrade the WebISIS production environment to run under the SMC portal. A detailed implementation plan will be drawn to migrate all existing self-service functions into the same framework. Some ideal prototyping development projects will be identified and developed in parallel to explore the new possibilities within this new development environment. During this phase, MIS will:

- Evaluate the current hardware configuration and development results to determine possible upgrade needs for the production environment in order to maintain services at reasonable performance level.
- Develop and implement a database and software application migration plan to deploy the portal architecture in the production environment.
- Design, develop, and formalize change control and request support procedures.
- Consolidate and redesign the report infrastructure to support updated deployment mechanisms and functionality.
- Identify staff training needs and conduct training in preparation for further expansion of portal functionality.

2004-2005: Maintenance and Expansion

As the portal environment become stable, MIS is planning to fully utilize the portal open architecture and integration capability to bring additional user functions, process automation, and multiple data types into the framework. The focus in this phase would be looking into implementing projects that bring the greatest value to the college community, both administratively and instructionally. Some of the anticipated candidates are to:

- Analyze, design, and develop mechanism to integrate county finance system with college data to facilitate college operations in all areas.
- Integrate county purchasing, inventory systems to streamline Information Technology project tracking, asset tracking, and support tracking system.
- Expand real-time data exchange functions to support existing or future partner organization web sites.
- Analyze, plan, and design the portal technology support for learning management systems.
- Expand administrative, faculty, and student portal functionality.

SMC's administrative technology environment has been utilizing products from the Oracle Corporation since 1989. The version 9 Internet product suite provides a complete infrastructure for developing, deploying and managing Web Services using Java/J2EE standards. Many SMC technology implementation plans are tailored to meet product availability and stability as Internet technology evolves with the industry. The production timelines of SMC administrative functions will be adjusted based on these feasibility factors for meeting performance expectations.

At the end of the five-year period, SMC's administrative systems will be fully migrated to the next generation of technical infrastructure. The college community will be able to take full advantage of the rich Internet information resources and integrate them into daily instructional and business activities seamlessly. The new infrastructure will enable the effective merging of data, information documents, images, and multi-media resources into a single interface. Additionally, this new administrative technology framework lays the groundwork for adopting a wireless environment as such technology becomes faster, more stable, and more secure.

2.3. Workstation and Network Access

Santa Monica College is committed to providing students, faculty, and staff with effective access to its electronic resources both through district-owned workstations available from any SMC campus and through networked access to SMC from users' privately owned workstations.

The Chancellor's Office and the Gartner Group developed guidelines for the number and type of workstations that should be provided to each student, faculty member, staff member, or administrator. These baseline standards were developed specifically for California Community Colleges and are listed in Appendix D. The following table gives a very brief summary of the standards themselves and compares them to SMC's actual values as of spring 2003.

Baseline Standard	SMC Parameters	Calculated Baseline	Actual Baseline	Gap
1 PC for every 20 FTES	21,000 FTES	1050 student use PC's	1300	+250
1 PC for every 1 FTEF, full time faculty only	400 FTEF	400 faculty PC's		
1 PC for every 3 FTEF, adjunct faculty only	400 FTEF adjunct faculty	133 adjunct faculty workstations		
1 PC for each staff/admin for 80% of FTE staff/admin	500 FTEF staff and administrators	400 staff/administrator workstations		

Each PC in service at SMC is configured with local network access, Internet access, standard office applications, email, and virus protection software. Many have access to additional, more specialized software as well, including the college's integrated student information system (ISIS).

SMC ensures that 5% of all student computing stations are accessible to disabled users by providing adjustable height tables and large monitors. Additional, more specialized equipment and software are available in the High Tech Center of the Disabled Student Services program.

For users working from home, as well as those using the college computing facilities, SMC also provides access to our campus network and the services it supports. To ensure that users have adequate access to networked resources from both campus and home locations, the Network Services department strives to:

- Provide the infrastructure to accommodate the college's growth and accelerated use of technology.
- Design the network to handle increased Internet traffic and the move of major college transactional business functions and instructional activities to the web.
- Allow faculty and staff to make secure high-speed connections into the network remotely.
- Increase network capacity for additional high-bandwidth applications such as audio, graphics and live streaming video.
- Design the network backbone to handle traditional voice communication telephone functions over the network.
- Implement centralized network management and troubleshooting for quick problem resolution.

- Increase the capacity of the campus fiber optic and copper cable infrastructure to support future high-bandwidth transmission to new and existing campus facilities.
- Explore the use of alternative transmission methods, such as wireless, to local and branch campus locations to save on public network costs.
- Provide for increased network reliability and security.

2.4. Instructional Tools

Instructional technology is selected or developed in order to meet one or more of the following goals:

- To improve student learning by employing technology that enhances and/or supplements traditional teaching strategies,
- To provide more flexible and convenient access to learning and teaching resources for students and faculty via the Internet and/or campus network,
- To provide students with access to technology that is in widespread use in the industries related to their chosen courses of study,
- To streamline course management tasks by migrating class rosters and other class data to online formats that are integrated with the college's student information system (ISIS).

2.4.1. *Classroom Technology*

The long-term goal for classroom technology is to equip each classroom with digital projection equipment, Internet access, and common media players such as DVD and VHS players. Detailed specifications for these "smart classrooms" have been developed. All newly constructed classroom facilities (beginning with the Science building which opened in 1999) are equipped accordingly. The cost of similarly equipping all existing classrooms immediately is prohibitive. Instead, mobile carts containing computers, projectors, and media players are available in most classroom facilities for the shared use of faculty. Additional carts are available for checkout at the Media Center. Budgets permitting, the total number of carts and smart classrooms is expanded annually. This goal is increasingly difficult to achieve, however, as older systems require replacement yet budget allocations for smart classrooms remain fixed or, in some years, are substantially reduced.

2.4.2. *Faculty Homepages*

The goal of the faculty homepage initiative is to improve student access to course information. Faculty homepages are hosted at <http://homepage.smc.edu> where all SMC faculty may request a homepage and receive direct access to create and edit its content themselves. As of December 2002, over 650 faculty are maintaining homepages at this site. Faculty homepages are accessible to the general public with no password protection. Thus, faculty are encouraged to use this space to post non-copyrighted information of general interest to their students and perspective students. For class-specific information, they are encouraged to use the learning management system provided, and for copyrighted materials, it is a necessity.

2.4.3. *Online Learning*

SMC entered the online learning arena via two distinct programs, both of which are supported by SMC's Information Technology departments.

- Online supplements to traditional classes are intended to enhance student learning for those who are enrolled in campus-based classes. Instructors must determine which content is best delivered in the classroom and which can be more effective online.
- Distance education classes are intended to make SMC classes available to students who cannot attend classes on campus due to geographic or scheduling constraints. Thus, distance education instructors must find online methods for delivering their entire course content.

Although the instructional goals of the two programs differ, there is substantial overlap in the technology tools that they employ and they therefore share some technical goals including:

- To employ a common software platform (currently called a Learning Management System or LMS).
- To integrate the LMS with the college's student information system.
- To integrate the LMS with other electronic resources including publisher and other third party content.

SMC's current LMS is provided and hosted by eCollege. While the software is the same for web supplements and for distance education classes, the support services provided by eCollege differ, with a higher level of support (including, for example, 24x7 phone support for faculty and students) available for distance education. Supplements to traditional classes are served by eCompanion (www.smc.edu/ecompanion) and distance education classes are served by eCourse (www.smconline.org).

It should be noted that the LMS market is a volatile one. In recent years, LMS vendors and pricing have undergone dramatic changes, with costs to colleges increasing sharply. As a result, some institutions have developed their own LMS systems internally. Others are forming consortia to do so collectively. However, the migration to a new LMS is extremely time-consuming for both faculty and technical staff and must not be taken lightly. When a change to a new LMS is under consideration, it is critical that the evaluation process begin long before the changeover is expected to occur since there must be ample time allowed for evaluation of the options by IT, administration, and faculty; for IT staff to build an interface between the LMS and our own ISIS system; and for migration of content from the old system to the new. Realistically, a minimum of 18 months is required for this process. The Academic Senate's Joint Information Services Committee and its Distance Education Committee met jointly to discuss this issue and have formed a subcommittee that will work to develop a set of weighted criteria for evaluating prospective learning management systems. Pedagogical, technical, accessibility, and cost considerations must be effectively incorporated into this evaluation algorithm.

2.5. Library Services

This section is coming soon...

2.6. Training and Support

The primary goal of the Technology Training program at SMC is to provide relevant, effective training, instructional materials, and individual assistance to District employees so they can make appropriate and efficient use of technology in the performance of their job responsibilities.

The Technology Training program provides training for SMC faculty and staff on the effective use of common software in the SMC environment. Training is available through:

- Regularly scheduled workshops,
- Customized departmental training,
- Online training courses,
- QuickSource Guides (printed help documents),
- Individual help via drop-in, telephone, email, or online help documents.

Curriculum for all live workshops is tailored to meet the needs of SMC users. For example, training on web development tools includes information on the best ways to access SMC's servers. Training on instructional tools includes information on best practices and other pedagogical considerations, and all training incorporates lessons on building universally accessible online materials.

Departmental training is further customized, sometimes focusing on discipline-specific software and always emphasizing the integration of the topic with other instructional or administrative tools in use at SMC. These workshops are popular among instructional departments as part of the departmental flex day activities.

In addition to training, other user support services are available from the various IT departments. Telecommunications maintains a telephone-based help system and handles requests for service and user questions related to general workstation usage. MIS maintains a help line and email address for user questions and requests related to the ISIS system, as does Network Services for questions and problems regarding network and email accounts and services. Academic Computing maintains a webmaster email account for website related issues and handles drop-in help for faculty, staff, and students in the open computing labs on campus. A primary goal of the proposed Information Technology reorganization is to centralize all these services in one department. The proposed User Support Services department would serve as a single point of contact for users with questions or issues about all SMC computing services and would manage the development, maintenance, and distribution of relevant documentation and training for users.

In 2003, members of the training program are working closely with Information Technology Staff from other IT departments who also interact directly with end users to begin centralizing user support resources. Together, they are building a website where help documents, policies, procedures, facility schedules, etc are located in a searchable, browseable format. The goal is to create one single place where users can quickly and easily locate help or other information about computing and telecommunications at SMC. Centralizing this information eliminates the current need for users to know which IT department or individual is responsible for the various IT areas. It also makes it easier for IT staff to keep information current and complete while eliminating redundant efforts by different IT departments. The Tech Knowledge Center will be completed in the fall of 2003.

3. Critical Issues for Technology Planning

3.1. Purchasing, Upgrading and Cascading Hardware & Software

The useful lifetime for a computer workstation is a topic of much debate, and its answer depends critically upon the applications for which that computer is employed. Until recently, most analysis recommended that workstations be replaced an average of every three years. However, in 2002, studies began indicating that four years is a more accurate estimate for the majority of users. The variation is related to trends in the industry as well as to variations among the needs of different users.

The needs of users at Santa Monica College vary dramatically from those at the high end where state-of-the art video editing and advanced programming techniques are being taught to those who use their computers only for basic word processing and email. It is therefore necessary to construct a plan for replacing, upgrading, and cascading workstations to get the maximum usage out of each, while simultaneously ensuring that each user is assigned a workstation that can accommodate the needs of his or her job or curriculum.

3.1.1. Purchasing New Equipment

All new computer equipment purchased must be installed and maintained by SMC's technical staff. To minimize the variety of replacement parts that must be kept in stock and the number of different systems with which the IT staff must be accomplished, it is necessary to set standard specifications for new equipment purchased. Recommended products including computers, printers, scanners, projectors, and software are listed on the SMC website and updated every six months by IT staff. Please see www.smc.edu/techplanning. However, users are advised to consult with IT for assistance prior to purchasing computers, software, and related peripheral equipment in case they have special needs or in case specifications have changed since the website was last updated. Contact information for the appropriate individuals is also listed on the site.

3.1.2. Computer Cascading

Computer cascading is the process of reassigning computers that are no longer useful for high end users to others who are using less demanding applications. In most cases, cascaded computers need upgraded RAM, a re-imaged hard disk, and cleaning both inside and out prior to their redeployment. Clearly, the cost of a RAM upgrade is far below that of a new computer, so cascading is very cost effective. However, the labor involved in installing the new RAM and otherwise preparing the computer for redeployment is extensive, particularly when systems are to be redeployed to individual locations, each with its own software requirements. It is therefore essential that the replacement and cascading plan take both the overall costs and the impact upon IT staff into account. To this end, telecommunications maintains a current set of minimum specifications for workstations to be cascaded. If a workstation does not meet these specifications, it will be removed from service.

It is also critical that the computer cascading plan be centralized so that computers can be deployed where they are most needed and most suitable. Therefore, individual departments should not assume permanent ownership of their workstations. When a user receives a new computer, the replaced system should be returned to Telecommunications to await redeployment according to the centralized plan.

3.1.3. Computer Laboratory and Classroom Workstations

A schedule for replacing and cascading student use workstations has been developed and is updated annually. See Appendix E. The plan indicates the date of purchase of all laboratory and classroom workstations, the system specifications, and an anticipated lifetime determined by the level of system resources demanded by the software in use in each facility. From these data,

anticipated replacement dates have been determined. In some cases, the replacement systems may be cascaded systems from other facilities.

3.1.4. Curriculum Development Workstations for Faculty

Desktop office computers are provided to full time faculty who have demonstrated a need for a computer to use in the development and delivery of curriculum. Each faculty workstation is equipped with a Windows operating system, Microsoft Office, Outlook, and common browsers and plug-ins. Additional software may also be installed according to curricular needs. Macintosh systems are allocated only to faculty whose curriculum mandates it, such as instructors who teach in disciplines where Macintosh-based applications are clearly an industry standard. Occasional exceptions are made in special circumstances and, due to the higher cost of Macintosh systems, cascaded workstations are used in these cases. Requests for a Macintosh should be submitted in writing to the Information Services Committee and should include the reasons for the special request.

Desktop computers are also provided for adjunct faculty use and are placed in shared faculty work areas. The faculty and staff computer lab is accessible by all SMC employees. In addition, most academic departments have a shared facility accessible by adjunct faculty where workstations are located for departmental use.

The Information Services Committee is drafting a new policy regarding the upgrading of all faculty workstations and expects to complete it in the spring of 2003.

3.1.5. Administrative Workstations

The majority of college-owned workstations are located in instructional areas. Several of the computer labs and classrooms used by departments that teach computer science, computer applications, or multimedia development require replacement systems every three years. Therefore, they provide a significant source of high quality cascaded systems for the remainder of the SMC community. Since these systems were purchased with categorical funds reserved for instructional uses only, they are cascaded to other instructional areas first. However, remaining systems are then cascaded to administrative areas according to need. Areas of greatest need are those where existing workstations cannot support the software applications their users require in order to perform their jobs effectively. A small number of systems are also used to replace newer but inoperable workstations.

3.1.6. Printers, Scanners, and Projectors

To leverage the College's limited resources most effectively, SMC strongly encourages users to share networked printers and scanners. In prioritizing requests for printers and scanners, the Information Services Committee considers the distance to the closest existing printer or scanner as the primary factor. Standard specifications for these devices are updated regularly by IT staff and can be found at www.smc.edu/techplanning. Users are requested to purchase these standard items in order to minimize the variety of systems that College staff must install, maintain, and repair.

In most major student labs and classrooms, printing services are contracted out to APS. This vendor sells print cards to students from vending machines, provides toner and paper for the printers, and maintains the printers and card reading systems. Printing is currently free to students in the Associated Students Lab, but the number of pages each student can print is limited, the limited being enforced by an in-house print monitor program. Such protections are necessary to control supply costs. This policy will be reconsidered when the next contract between AS and the District is negotiated.

Digital projectors are now included in the specifications for all newly constructed classrooms. The Media Center also provides carts containing computers, VCR's and projectors. They are

available for checkout by reservation. The Information Services Committee prioritizes departmental requests for projectors for existing classrooms based upon the frequency of each department's current usage of the shared carts. As with other equipment, standard specifications for projectors, installation kits and services are maintained at www.smc.edu/techplanning. Please consult with Media Center prior to purchasing a projector. The Media Center also maintains an inventory of replacement light bulbs for digital projectors and their staff is trained to conduct the replacements. These bulbs typically cost hundreds of dollars each and their lifetimes are reduced drastically if they are not installed properly, so please contact the Media Center for all projector bulb replacements.

3.1.7. Software Licensing

Information Technology maintains an inventory of licenses for all software in use within multiple departments in order to take maximum advantage of volume discounts on software purchases. Campus software is purchased with software maintenance agreements whenever available. Such agreements entitle the college to version upgrades at no additional cost and, most importantly, can be renewed prior to expiration for a fraction of the cost of purchasing new licenses. Thus, they are very cost effective over the long term.

The Foundation for California Community Colleges has negotiated contracts with a wide variety of software (and hardware) vendors that provide the college with access to deep discounts on many common software titles including all Microsoft, Adobe, Macromedia, and Symantec products. Users should consult www.smc.edu/techplanning prior to purchasing software in order to obtain the best possible pricing.

Many software titles are available to the college on a concurrent user basis. This means that the college can install the software on an unlimited number of workstations, provided that the number of simultaneous users of the software does not exceed the number of licenses owned. To take advantage of this kind of licensing, the college is required to run Keyserver software on its network. Keyserver tracks the number of users of each software title at any given time, and, if the number of users exceeds the number of licenses owned, notifies the users that s/he must wait for a license to become available before the software will launch. Many software titles are used only occasionally by most users and are therefore excellent candidates for concurrent licensing. Adobe Acrobat is a good example. SMC users have much to gain from concurrent licensing programs, so SMC purchased and installed Keyserver in 2002 and is now taking advantage of concurrent licensing for many software titles.

In addition to the software titles maintained in the centralized inventory, individual departments maintain their own inventories of discipline-specific software and must request upgrades or maintenance renewals as needed through the regular technology request process.

Software licensing issues are evolving as the number of students working on home computers increases. While vendors of high cost software typically make that software available to colleges for use in the classroom at deeply discounted rates, most do not grant permission for that software to be installed on student-owned computers. The cost of some specialized software is so prohibitive that vendors are beginning to recognize the issue. Oracle and Microsoft have both launched initiatives to provide their developers' tools free to students enrolled in classes where these tools are the focus of the curriculum. The college pays modest membership fees to enable our students to participate in these programs. As student use of home computers expands, the need to provide affordable access to necessary software will intensify.

3.2. Facilities

3.2.1. *Specifications for New Instructional Facilities*

The college has developed a master plan for facilities. The successful passage of a local bond issue, Measure U, in March 2002 will support multiple new construction projects at the college. Standard specifications for technology capability in new instructional facilities are being developed and will be reviewed and revised on a regular basis to address changes in technical, instructional, and accessibility needs. Specifications are being developed for the following:

- Smart classrooms
- Computer classrooms
- Computer labs

3.2.2. *Long term Facilities Planning Issues*

Long-term issues currently being addressed include:

- **Wireless vs. wired networking:** Currently the college has a completely wired network. It is anticipated that all new buildings will include wireless capability. The college needs to develop standards for wireless network implementation including how access is granted and monitored, what additional security measures are required, and the number of additional staff required to maintain the additional access and traffic. The first experiment with wireless networking is planned for the opening of the college's new library facility in the fall of 2003.
- **Computer labs:** We highly recommend that a centralized multi-functional drop-in computer lab or labs for students/faculty/staff be considered in facilities planning. Staffing needs and server rooms in a distributed setting are costly and student usage of lab resources are reduced when labs are designated only for specific disciplines. Ideally, this facility would also include a centralized location for the IT departments with appropriate power, cooling, and security provisions.

A main centralized computing facility with limited distributed computing locations when necessary would maximize usage of our resources and provide the most cost effective solution.

3.2.3. *Technology Infrastructure*

Current technology infrastructure is at or beyond capacity. Both short and long range plans are being developed to address the deficiencies and future needs. Items that need to be addressed in the short term to maintain and secure existing infrastructure include:

- **Increased server capacity:** the main server, located in Drescher Hall, needs additional capacity to support current demand and provide sufficient backup.
- **Expanded facility infrastructure to support main server room:** a separate A/C unit is needed for the server room to insure proper temperatures are maintained, especially during power failures; a fire suppression system and appropriate modifications are needed for the server room to maintain the integrity of the system in the event of fire. The server room itself is also at capacity. The size of the room and the main power feed are able to accommodate current needs only—there is no capacity for growth.
- **Expanded infrastructure to support the telephone network:** the District's main phone switch, voice mail system, second network backbone, Internet firewall and proxy servers are located in the Media Center, room 132. Since the phone system was moved to the Media Center after the 1994 earthquake, the size of the phone system has increased and the college network, campus police dispatch, college switchboard, college security monitors and fire alarm monitors have all been moved to the space placing additional

burdens on the existing infrastructure. The new generator to supply the Library building will provide sufficient backup to cover the phone system in the event of an emergency. However, additional electrical wiring will be needed to hook the new generator to the system. Additionally, the current HVA/C system supporting the phone room is insufficient for the heat load now generated by the equipment.

The ideal solution to these and other challenges faced by the Information Technology departments is to centralize the core services equipment, human resources, and primary student computer lab facilities at one main location. It is far more cost-effective to provide the appropriate environment to protect our equipment and sufficient staff to support users when a centralized model is employed. Other distributed locations can be identified to serve as backup sites or to meet specific functional needs as necessary, but should not be created without first analyzing other options carefully.

3.3. Personnel

3.3.1. *Proposed IT Reorganization*

SMC's IT departments have grown rapidly in recent years as the use of PC's for instruction and office work has increased world wide. A natural result of this rapid growth has been the creation of many new IT staff and management positions organized according to a structure that was designed to meet the college IT needs some 10-15 years ago. Using IT staffing recommendations for higher education developed by the Gartner group based on their extensive research, comments and suggestions from members of the SMC user community, and the collective experience of our own IT staff and management, we propose a reorganization of the existing information technology departments and programs.

Some prominent features of the plan include combining teams that currently provide redundant functions to different groups of users, the creation of a single unit responsible for the initial handling of all user inquiries and requests, a broader array of promotional paths available to IT staff, and, where possible, delineating interpersonal communication roles from strongly technical roles. The proposed new organizational structure consists of three departments: IT User Support Services, IT Network Support Services, and Management Information Systems.

It is important to note that this proposal represents a long-term goal and that the implementation of this or a similar reorganization must occur gradually. Time must be taken to develop detailed documentation of the standards and procedures relevant to each function, and the migration must be thoroughly coordinated to ensure that no function is left with inadequate staffing during the transition. Severe budget constraints currently faced by the college must also be considered and may significantly slow the implementation process as the creation of new positions is now on hold pending restoration of previous levels of state funding.

IT User Support Services Department

The User Support Services department is responsible for all front-line user support for SMC students, faculty, staff, and administration. The primary goal of this team is to provide a seamless interface between IT and the user communities. Members of this team must have excellent interpersonal and communication skills, a thorough understanding of the overall structure and function of the IT department and the various teams that comprise it, and a good working users-level knowledge of the desktop operating systems and applications in common use campus wide. Users should be able to bring questions and issues to any member of this team and receive immediate and courteous assistance or immediate, documented referral of the issue to the appropriate IT team.

User Support Services also functions in a proactive role to develop training materials, document procedures, develop and implement training and support plans for new IT initiatives, guide users through the technology planning process, coordinate implementation of technology projects, maintain the campus wide inventories of hardware and software, maintain the IT website including regular newsletters and other IT publications, and provide ongoing training to all of its own team members on technical, procedural, and customer service issues.

User Support Services also provides services to departments and individuals maintaining web pages on the SMC sites. This service is focused on site content creation and maintenance. Site design services are also available to departments and programs and include training on maintenance and update strategies. Individual employees wishing to maintain a homepage can also receive training and trouble shooting assistance.

IT Network Services Department

The Network Services Department is responsible for the deployment and security of all computer, telephone, and network-related hardware and software campus wide, including installations, troubleshooting and repair, maintenance of college servers and network applications, as well as research and development on new technologies available for networked computing environments.

The Network Services team will work together to provide a higher level of support to the entire college community. With the elimination of multiple support and repair groups, our faculty, staff and administration will be relieved of the confusion of not knowing whom to call when help is needed. We will service all district owned personal computer hardware, software and all attached peripherals regardless of the location or the user group it serves.

Management Information Systems Department

The MIS department is responsible for the planning, design, programming and the implementation of cost effective integrated information systems for the college. The primary role for MIS is to provide technology solutions to automate the processes and information flow among all college's operational units, include student services, academic affairs, business services, and human resources.

All team members are expected to understand the college's goals, assist area administrators/managers to formulate technology requests on business automation, analyze technology possibilities, and derive feasible, effective programming solutions and results. All team members are also expected to research and/or be trained on up-to-date technological methods and best practices to optimize the overall performance of the information systems and effectiveness of all deliverables.

3.4. Systems Management

The Information Technology departments have always placed special emphasis and effort on maintaining the underlying technology infrastructure to ensure overall system availability, accessibility, and maximum performance within a secured environment. Every new technology initiative comes with associated hardware requirements, software upgrade plans, and network/system capacity plans. It is important to maintain current knowledge of hardware and software availability, as well as proper sizing evaluation, to gain an optimized return on investment.

The SMC Information Technology Department emphasizes system management support in all planning and project implementation cycles to ensure the smooth transition from pre to post technology deployments. The projected system management plans are summarized as follows. Detailed execution objectives for each year are listed separately in the annual objectives.

3.4.1. Security plan

Each IT department at SMC cooperates in enforcing security policies established to protect the integrity of the information resources of the college. Re-engineering of technology security implementation is an ongoing effort from all areas of IT. Security restructuring efforts are planned and implemented with all major software version upgrades to take advantage of any functional improvement from those products.

The vast increase in the use of information technology at SMC has heightened the security needs for the SMC network and data tremendously. Users are steadily gaining greater access electronic access to confidential information via their SMC network and ISIS accounts. Implementation of these convenient services generates a greater reliance upon individual users to take responsibility for maintaining a secure computing environment. The lack of a formal computer and network use policy has been a hindrance to IT staff in attempting to take appropriate action when network or system security is threatened. The IT departments are therefore working closely with various institutional constituents to formalize a policy that governs the general computer, network, website, and e-mail use. A draft of this policy, written by the Information Services Committee, approved by the Academic Senate, and currently under evaluation by other constituents, is available in Appendix C. Implementation of this policy will enable more advanced security protections and more efficient results.

The following represent the primary security related issues and implementation plans in effect. The implementation descriptions and timelines are detailed in the annual objectives.

- Physical infrastructure security: Information Technology staff ensure network, telephone, servers and other technology related devices and equipment are consistently located in locked rooms or closets. Critical equipment should be installed in access-controlled environments to which a small number of staff members have admittance. Critical equipment server rooms need an appropriate uninterruptible power supply (UPS) and power generator installed to protect the availability of the network, servers, and services. Appropriate fire protection equipment should also be installed and earthquake prevention activities implemented.
- Password policy: Secure passwords are the most effective security mechanism in a networked environment. Their importance cannot be overemphasized. The areas of greatest vulnerability are those that involve access to confidential data and those over which some degree of control has been ceded to individuals. Strong passwords (i.e. those that are complex, not easily deduced and that must be changed regularly) help to reduce these vulnerabilities by protecting direct access to the network and e-mail and by

improving security for subordinate or co-dependent systems that are part of a single sign-on environment. In the spring of 2003, the Information Services Committee and the Network Services department developed a strong password policy. It was implemented successfully in June of 2003.

- Directory structure: It is essential to utilize a Lightweight Directory Access Protocol (LDAP) compliant directory structure to host domain network directory functions. These services involve the regular maintenance of the user and computer accounts database, as well as ensuring replication of this data from the main campus to all satellite campuses. The tasks of managing e-mail enabled distribution lists, list views, and student account creation also fall into this category. Security is then enforced and integrated with subordinate or co-dependent systems that are part of a single sign-on environment.
- Virus protection: Information Technology staff maintain constant updates to anti-virus software on workstations, servers and on all SMC e-mail systems to proactively protect the college and its correspondents from viruses. They also help users recover systems damaged by viruses and provide proper training to direct users on protection awareness and provide references to resources on virus prevention.
- Network traffic segregation/filtration: Data originating from student lab workstations should be kept segregated from confidential faculty/administrative data through the use of virtual local-area networks (VLANs), a supported feature implemented as part of the last network upgrade that logically groups physically distinct network devices according to function and is ideally suited for just this type of traffic containment. In addition, access control lists configured at routers across campus filter network traffic by protocol and connection endpoints. As a further precaution, a Windows 2000 Active Directory domain group policy prohibits access by students to any faculty/staff workstation.
- Network firewall/IDS: A secure system is one that detects and blocks access attempts that are either unauthorized and/or arrive in such large numbers as to constitute a malicious dedicated denial-of-service (DDOS) attack. A firewall handles such breaches that originate from the Internet (external) by intervening in the campus' outside connection. A robust and stable firewall system should be installed to ensure better performance and provides higher security, throughput, availability, and reliability.
- Internet, network and data security: Network traffic is managed through core distribution and access layer network devices. In addition, a proxy service optimizes Internet connectivity for faculty, staff, and student users on the main campus and all its satellite campuses, as well as for dialup access users.
- Data/systems backup and recovery: Backup/recovery strategies should be fully implemented and documented as part of the departmental internal security policy as well as the disaster recovery plan. Depending on functional requirements and data retention periods, backup frequency and backup availability varies. All mission critical backup media need to be stored in safe and controlled locations, including an off-site storage plan that works with the backup strategy.

It would be ideal if the college signed a disaster recovery agreement with a third party to duplicate our full network and computing environment. To date, however, the cost of this option has been prohibitively high.

3.4.2. *System performance and capacity plan*

- Performance benchmark and service agreement: All technology services need to have a clear measurement benchmark defined. System response time, availability, accessibility (e.g. LAN based vs. internet enabled), and data backup/recover strategy need to be clarified with end users to match the expectations of resource availability.
- Daily pro-active maintenance and monitoring: Part of system/network administrators/analysts daily routine work is monitoring the necessary system event logs and trace files to identify potential problems or resource shortages. It is also necessary, as part of IT internal procedures, to document system changes and problem resolutions to an identified standard location to facilitate any follow-up activities or future trouble-shooting of system issues by the same or different technical support staff.
- Capacity planning: With the growing complexity of commonly used software, increases in usage by users, and growing technical services provided to users, it is critical that system resource capacity planning be addressed at least annually. In each budget cycle, the proposal for the expansion of servers, server components, devices, and other peripherals are planned. The effort and resources are estimated using a Total Cost of Ownership (TCO) model and then proposed to the technology planning constituents. This proactive planning effort relies primarily upon the recommendations of SMC's technical staff. Their knowledge and awareness of the systems current and future possibilities are crucial to the process.

3.4.3. *Desktop software Installation and software metering plan*

- System Management Software: SMC has currently manages more than 2000 workstations. Therefore, individual desktop visits have become the least feasible method for software upgrade procedures, particularly considering the high frequency of upgrades and changes required by users. A practical solution to manage this volume and meet the variety of requirements is deployment through a centralized and standardized method. It is crucial for IT to invest in centralized management software tools and technical skills to use this cost effective approach. Microsoft's System Management Server (SMS) was selected to be used with Intellimirror Group Policies (native to MS-Windows) to accomplish centralized software distribution tasks whenever possible. SMS also partially serves the need for collecting asset information and offers some remote diagnosis capabilities to facilitate remote trouble-shooting of problems.
- Software metering and license compliance: SMC is currently offering more than fifty titles of campus-wide licensed software, as well as hundreds of additional discipline-specific titles. The management and enforcement of use licenses is a tremendous effort for technical staff. Unlimited use licenses are too costly for the college to purchase in all but a handful of cases, so monitoring installation locations and usage levels is critical. Software installation rights and concurrent usage rights vary significantly from one software manufacturer to the next. Again, the best method to ensure compliance with SMC's software license agreements while minimizing the impact upon IT staff workloads is a centralized metering mechanism. Keyserver, a LAN-based software license control tool, has been acquired and implemented to accomplish this goal.
- Cloning of workstation images: Information technology staff do not install all software packages onto new, dysfunctional, or cascaded workstations individually. Instead, one complete software "image" is built, then copied or "ghosted" intact onto additional workstations. These images need to be identified, documented, stored, archived and deployed with standard tools and procedures. In the past, SMC used Symantic's Ghost software and Image Cast software; however, we are currently standardizing on Ghost

version 7 and planning for the creation of a file server to store versions of each image for change management, documentation, and other administrative purposes.

- **Student technology resource management:** The college provides about 1200 student use computers housed in a variety of student computing facilities, many of which are equipped with specialized computer hardware and software. There are policies defined based on a student's enrollment pattern, membership, or other characteristics that determine which students may access which systems. To manage this variety of computing facilities and associated software, a combination of off-the-shelf software and software developed in-house was implemented to achieve administrative functions including: workstation policy enforcement, wait-list management, lab monitoring, student workstation usage tracking, lab capacity planning, fee-based printing and print quota management, and other utility programs to facilitate student requests for e-mail or network accounts.

3.4.4. *Technology assets and support services management plan*

With the evolution of Internet technology, computer hardware and software has become one of the essential tools for staff, faculty, and students to conduct their daily business. SMC technology assets have grown tremendously throughout the past five years. Currently, most technology assets are recorded in the SMC purchasing system (developed in-house.) Then, as equipment arrives and is deployed, most are entered again into the SMC support and asset tracking software, Remedy. However, since, this software was purchased mainly for the purpose of supporting help desk ticket tracking; the asset functions are very limited.

The SMC in-house purchasing system will be replaced by the newly design and implemented County PeopleSoft Finance system. Depending on the flexibility of up loading necessary data from the County system, there is strong possibility to integrate the data with WebISIS (Web-enabled Integrated School Information System) and design an in-house IT asset-tracking system to record all hardware and software purchases, deployments, and cascades. At that time, the appropriateness of the Remedy system will be re-evaluated in terms of its functional and the feasibility of integration with WebISIS. Information Technology has a long-term commitment to streamline IT project procurement, asset tracking, and post installation support of all the assets. This approach would also facilitate equipment capacity planning and resource allocation as well as support and maintenance.

