APPENDIX A

INFORMATION TECHNOLOGY REQUIREMENTS FOR CSU END-USERS

INTRODUCTION

This document[1] identifies the personal computer systems environment requirements that CSU end-users will need to access the telecommunications infrastructure for university-related tasks and activities. Personal computer systems refer to resources and other devices whether stationed on or off the campus, place-bound (desktop), or mobile (notebook, handheld), together with the accompanying software and peripherals. The sections of this document on *Desktop and Unified Messaging System* recommend messaging standards, operating systems and client software and hardware that will help support these end-user requirements.

The end-user requirements listed below are based upon an analysis of activities commonly accomplished by CSU students, faculty and staff as part of their university experience. Specific tasks associated with these activities were identified and paired with the requirements for performing them electronically. The result was a set of CSU user profiles useful in carrying out detailed ITS-TII planning. Because the technologies, tools and methods of using them will change as new technologies emerge, mechanisms must be found to update the CSU end-user requirements and technology specifications on a regular basis.

INFORMATION COMPETENCIES FOR STUDENTS

The primary goal of providing the best education for CSU students is the driving force behind the ITS-TII. Information competency skills that students should acquire to be successful in the university and in the 21st century were identified in the 1996 report, *Information Competence in the CSU*. Many of the end-user requirements identified below relate to academic expectations described in that report.

In order to be able to find, evaluate, use and communicate information, students must be able to demonstrate these skills in an integrated process:

- State a research question, problem or issue;
- Determine the information requirements for the research question, problem or issue;

[1] Contributors of this section include: Mike Mahoney (CSULB) and Penny Peterson (CSULB).

- Locate and retrieve relevant information;
- Organize information;
- Analyze and evaluate information;
- Synthesize information;
- Communicate using a variety of information technologies;
- Use the technological tools for accessing information;
- Understand the ethical, legal and sociopolitical issues surrounding information and information technology;
- Use, evaluate and treat critical information received from the mass media; and,
- Appreciate that the skills gained in information competence enable lifelong learning.

While some of these skills do not require the use of information technology tools, most of them do require productivity or communications tools (e.g., word-processing, e-mail and web browser applications) for research, documentation, presentation or collaboration purposes.

END-USER PROFILES

Student User Profile

Students engage in a variety of educational, administrative and extra-curricular activities when applying to and attending a CSU campus. In particular, students:

General / Administrative

- Find general information (location, contacts, applications, extra-curricular activities);
- Find academic information (programs, schedules, articulation, proficiency exams);
- Apply to a CSU campus;
- Apply for financial aid;
- Submit documents related to application, enrollment and financial aid;
- Register for classes;
- Pay for classes;
- Pay lab, health, late and other fees;
- Purchase parking permits and obtain university identification with smart card;

- Purchase books and other supplies;
- Communicate *synchronously* with other students, faculty, staff and community members; and,
- Communicate *asynchronously* with other students, faculty, staff and community members.

Educational

- Meet with academic advisors;
- Meet with instructors;
- Attend classes, labs and discussion sections;
- Collaborate on projects with groups of students;
- Study course materials (individually or in groups);
- Perform experiments for classes;
- Take field trips;
- Research materials for projects and other needs;
- Prepare papers, course assignments and class projects;
- Submit assignments and projects to instructors; and,
- Take oral and written examinations.

Extra-Curricular

- Participate in campus-related clubs and other groups;
- Attend university-sponsored on- and off-campus events; and,
- Use campus-based services: travel, shopping, athletics, banking, entertainment, etc.

The above list is suggestive rather than exhaustive. Many of the specific tasks undertaken during the course of these activities can be accomplished using modern technologies. To accomplish them successfully, students need the appropriate tools, training, and support and access to a supportive telecommunications infrastructure. Tasks and corresponding end-user requirements necessary for their accomplishment are identified in a subsequent section.

Faculty User Profile

Faculty members are involved in a wide range of educational, scholarly and creative, administrative and other activities. In particular, faculty:

General / Administrative

- Communicate *synchronously* with other faculty, students, staff and community members;
- Communicate *asynchronously* with other faculty, students, staff and community members;
- Submit employee-related documents (time-worked, travel claims, etc.);
- Purchase a parking permit and other university goods and services;
- Purchase books and other supplies;
- Schedule classes, office hours, meetings, etc.;
- Attend department, college, campus and other committee meetings; and,
- Reach out to the community.

Educational

- Develop new courses and prepare class materials;
- Serve as academic advisors and check student records;
- Meet with students (individually and in groups);
- Conduct classes (lecture, discussion, laboratory, field trips, learner-centered);
- Prepare and grade class assignments;
- Prepare, administer and grade examinations; and,
- Assign grades and submit them to the university.

Scholarly and Creative

- Collaborate and share materials with colleagues on- and off-campus;
- Conduct research using a variety of resources;
- Write textbooks, conference papers and journal articles (individually or collaboratively) ;
- Attend professional conferences;
- Give presentations at conferences;
- Serve as journal editors, referees and members of scholarly and professional boards;
- Prepare grant proposals; and,
- Administer grants.

As was the case with students, many of these tasks can be accomplished most effectively and efficiently using modern technology tools.

Staff/Administrator User Profile

This heterogeneous group of end-users includes campus administrative officers, administrative and clerical assistants, student support professionals, fiscal officers, facilities employees, information technology consultants, etc. Many of these individuals perform tasks similar in requirements to those of students and faculty in addition to a variety of job-specific tasks. Examples of the latter include:

- Communicate *synchronously* with other staff, faculty, students and community members;
- Communicate *asynchronously* with other staff, faculty, students and community members;
- Administration of student registration and schedules;
- Helping students with advising, counseling, health and other support needs;
- Budget planning and administration;
- Paperwork and document workflow;
- Information dissemination;
- Management of a physical or logical infrastructure;
- Communication with vendors and other commercial employees;
- Performing a variety of other job-specific tasks; and,
- Many of the same activities as students and faculty.

Off-Campus Community Members User Profile

Members of alumni, K-14 and other community groups are involved in a variety of activities related to the university. In particular, members of this group:

- Communicate with alumni, faculty, and staff and participate in campus-related activities;
- Find information about and enrolling in continuing education programs;
- Find information on sports activities;
- Find information on concerts, lectures, cultural and other campus events;
- Purchase tickets to sports and other events;
- Attend university-sponsored events *on-campus;*

- Attend university-sponsored events *off-campus*;
- Participate in educational, research, outreach and other campus-related programs;
- Share educational resources;
- Advertise job opportunities and contacting student interns and graduates; and,
- Support the campuses through donations and other charitable activities.

HOW END-USERS USE TECHNOLOGY

Following are tabular listings of common tasks that CSU end-users can perform electronically together with the corresponding technology requirements. The electronic interactions between people described below are *alternatives, not substitutes*, for more traditional face-to-face interactions. These lists are suggestive rather than exhaustive, and would benefit from input from the constituency groups.

Students Using Technology

Student Activity/Task	Enabling Technology	How Technology Used
Student General/Administrative		
Find general information (location, contacts, applications, extra-curricular activities)	Web Directories E-mail Voice	Find and browse campus web site. Search directories for campus personnel. Send e-mail to campus personnel. Get attachments. Call campus using Internet phone software.
Find academic information (programs, schedules, articulation, proficiency exams)	Web, E-mail Voice Calendaring	Similar to above, but more interaction with faculty. Search on-line schedules on web.
Apply to a CSU campus	Web E-mail	Go to campus applications web site. Fill out on-line form. Receive confirmation via e-mail.
Apply for financial aid	Web E-mail	Go to financial aid web site. Fill out on-line form. Receive confirmation via e-mail.
Submit documents related to application, enrollment, fin. aid	E-mail	Send attachments of common format files and scanned documents via e-mail.
Register for classes	Web E-mail Voice	Use web interface to registration system. Receive confirmation via e-mail. Use voice response registration over the Internet.

Student Activity/Task	Enabling Technology	How Technology Used
Pay for classes	Web E-mail	Use secure electronic commerce over the web. Receive confirmation via e-mail.
Pay lab, health, late or other fees	Web E-mail	Use secure electronic commerce over the web. Receive confirmation via e-mail.
Purchase parking permit and obtain university identification with smart card	Web E-mail	Use secure electronic commerce over the web. Receive confirmation via e-mail.
Purchase books and other supplies	Web E-mail	Use secure electronic commerce over the web. Receive confirmation via e-mail. Use smart card.
Communicate synchronously with other students, faculty, staff and community members	Voice Videoconference Chat Rooms	Real-time conferencing over the telecommunications infrastructure using voice and videoconferencing applications. Search directories.
Communicate asynchronously with other students, faculty, staff, and community members	Discussion group E-mail Voice message	Send and receive messages using various media to be read/viewed at a convenient time from on-campus and remote locations. Search directories.
Student Educational		
Meet with academic advisors	Calendaring Videoconference E-mail Voice	View on-line schedule for advisor's availability. Electronically "meet" with advisor over Internet. Send e-mail message with questions to advisor. "Call" advisor using Internet phone.
Meet with instructors	Videoconference E-mail, Voice	Same as above with "instructor" replacing "advisor."
Attend classes, labs, discussion sections	Videoconference Voice, Chat Room Discussion groups Elec. Whiteboard	Electronically "attend" class over Internet. Teleconference with Internet phone. Use other collaborative tools. Share ideas via electronic whiteboard over network.
Collaborate on projects with groups of students	Web, E-mail Voice, Chat Room Discussion groups Elec. whiteboard	Use collaboration tools to share ideas with other students. Send standard format e-mail attachments. Use public folders to share documents and other media. Use asynchronous and synchronous methods.
Study course materials (individually or in groups)	Similar to above	Similar to above

Student Activity/Task	Enabling Technology	How Technology Used
Perform class experiments	Web E-mail, Voice	On-line experiments via the web or public folders. Submit experiment results via e-mail attachments.
Take field trips	Streaming Video Videoconference	Participate in some field trips "virtually" to save on time and money.
Research materials for projects and other needs	Web E-mail	Use search engines to research library and web. Download materials for projects over Internet.
Prepare papers, course assignments and class projects	Word-processor Spreadsheet, etc.	Use standard word-processor, spreadsheet and discipline-specific applications to prepare materials.
Submit assignments and projects to instructors	Web E-mail Calendaring	View on-line schedule for due dates. Send standard format email attachments to instructor. Receive confirmation / read-receipt via e-mail.
Take oral and written examinations	Web E-mail, Voice Videoconference	Use secure web browser to take on-line exam. Receive and submit exam via e-mail attachment. Take oral exam via voice or videoconference.
Student Extra-Curricular		
Participate in campus-related clubs and other groups	Web, E-mail Discussion groups Calendaring Public Folders	Club supports web site dedicated to club activities. Communicate using various applications. Schedule events using calendaring application. Share documents and other media via public folders.
Attend university-sponsored on- and off-campus	Streaming Video Videoconference	Watch intellectual, cultural, sports or other events using streaming video via the web or other source.
Use campus-based services: travel, shopping, banking, entertainment, sports, food and others.	Web E-mail Voice	Use secure electronic commerce over the web. Receive confirmation via e-mail.

Faculty Using Technology

Faculty Activity/Task	Enabling Technology	How Technology Used
Faculty General/Administrative		
Communicate *synchronously* with other faculty, students, staff, and community members	Videoconference Streaming Video Voice, ChatRoom	Real-time conferencing over the telecommunications infrastructure using voice and videoconferencing applications. Search directories.
Communicate *asynchronously* with other faculty, students, staff and community members	Discussion group E-mail, Directory Voice mail	Send and receive messages using various media to be read / viewed at a convenient time from on-campus and remote locations. Search directories.
Submit employee-related docs (time-worked, travel claims, etc.)	Web E-mail	Go to campus business web site. Fill out on-line form. Scan documents and upload to university database.
Purchase a parking permit and other university goods / services	Web E-mail	Use secure electronic commerce over the web. Receive confirmation via e-mail. Use smart card.
Purchase books and other supplies	Web E-mail	Use secure electronic commerce over the web. Receive confirmation via e-mail. Use smart card.
Schedule classes, office hours, meetings, etc.	Web E-mail	Use common scheduling tool with web interface.
Reach out to the community	Voice, Web, E-mail Videoconference	Synchronous and asynchronous communications via various media.
Attend department, college, campus and other committee meetings	Voice, Web Videoconference Streaming Video	Synchronous communications via various media.
Faculty Educational		
Develop new course and prepare class materials	Word-processor Spreadsheet Presentation App. Web development	Develop lecture / presentation materials with productivity tools. Develop course web site using web development tools such as Instructional Management System framework.
Serve as academic advisors and check student records	Communication tools, legacy data access via web	Check student records using the web interface to legacy data. Fill in on-line advising information. “Meet” with students anyplace.
Meet with students (individually and in groups)	Streaming video Videoconference	“Meet” with students anyplace at anytime using standard synchronous communication tools.

Faculty Activity/Task	Enabling Technology	How Technology Used
Conduct classes (lecture, discussion, laboratory, learner-centered and other environments)	Presentation app. Streaming video Videoconference Chat Rooms	Give presentations, demonstrations using presentation tools from anyplace to anywhere.
Prepare and grade class assignments	Word-processor Spreadsheet Web development	Develop assignments with word-processor or web development tools. Use spreadsheet to record grades.
Prepare, administer and grade examinations	Word-processor Spreadsheet Web development	Write exams with word-processor or web development tools. Use spreadsheet to record grades. Use encrypted e-mail to send grades to students.
Assign grades and submit them to the university	Spreadsheet E-mail	Submit encrypted standard spreadsheet or other grade form to the university via secure telecommunications infrastructure.
Faculty Scholarly and Creative Activity		
Collaborate and share materials with colleagues on/off-campus	Public folders Secure web e-mail	Store materials in publicly available folders. Synchronous and asynchronous communications via various media.
Conduct research using a variety of resources	Web access to Library databases	Search web and campus and other library databases for research material in various media formats.
Write textbooks, conference papers and journal articles (individually or collaboratively)	Word-processor Spreadsheet Web development	Use productivity or web development tools to develop scholarly work.
Attend professional conferences	Streaming video Videoconference	Attend conferences "virtually" to save time and travel costs.
Give presentations at conferences	Presentation app. Streaming video Videoconference	Use mobile devices to bring presentation to conference or present "virtually."
Serve as journal editors, referees and members of scholarly and professional boards	E-mail, Web Word-processor Web development	Synchronous and asynchronous communications with colleagues via various media. Develop/access web site containing journal materials.
Prepare grant proposals	Word-processor Spreadsheet Web development	Write grant proposal using word-processor or web development tools. Use spreadsheet to develop budget.

Faculty Activity/Task	Enabling Technology	How Technology Used
Administer grants	Word-processor Spreadsheet Web development	Write memoranda using word-processor, use spreadsheet to maintain grant budget. Develop web site for grant-related activities.

It is clear from these requirements that CSU faculty need at least as much technology access as students do. Most faculty have additional needs beyond those of students, such as greater access to legacy data and more privileges to the telecommunications infrastructure for uploading class materials and grades.

Like students, faculty tend to be mobile users. They work in several locations, including their campus offices, classrooms, labs, home office, etc. The technical specifications in the related *Desktop* recommendations reflect this mobility.

Staff/Administrators/Community Members Technology Uses

Many of the common tasks and activities for staff and administrators are similar to those described for students and faculty. Because staff and administrators will need much of the same technology previously described for students and faculty, the requirements are not repeated here. Community members, on the other hand, generally have fewer interactions with campuses and thus need less technology access.

Many staff members have job-specific tasks that they already perform with modern technology tools. For example, a fiscal officer would likely need to use an on-line fiscal management system or a plant manager might review the status of a facility on-line. These important job-specific applications are not commonly used by students and faculty, but are probably accessible via the same telecommunications infrastructure. Since the goal here is to determine common end-user requirements, these job-specific applications are not further examined in this document.

End-Users with Disabilities Technology Uses

End-users with disabilities have special technology needs. The following are illustrative:

Disabled User	Enabling Technology	How Technology Used
Person who uses a *wheelchair or has orthopedic restrictions* uses a computer for general use.	Computer with adaptive key-board, alter-native mouse, voice input.	Student, faculty or staff end-user uses specialized input devices to interface with a computer to accomplish the same tasks as any other end-user.
Person who is *blind or has low vision* uses a computer for general use.	Braille display, large screen, screen magnifier, Voice I/O, OCR, Braille printer.	End-user uses specialized input or output devices to interface with a computer to accomplish the same tasks as any other end-user. Optical Character Recognition (OCR) system used to scan text on paper. Scanned text turned into voice output.
Person with *repetitive fine and gross motor restrictions* and uses a computer.	Alternative and adaptive input and output devices.	End-user uses alternative devices to eliminate or minimize difficulties associated with computer operations.
Person who has *attention deficit disorder or dyslexia* uses a computer for general use.	Hardware and software to focus attention.	End-user uses specialized devices to improve control of computer for general use.
Person who has *epilepsy* uses a computer for general use.	Voice input and output.	End-user uses voice input and output to reduce exposure to intermittent video signals that can cause a seizure.
Person who is *deaf or hearing impaired* uses a computer for general use.	Captioning and "visual signal" system software.	Captioning turns audio into video displayed text. Visual cues used to signal audio sounds emitted.

DERIVED TECHNOLOGY REQUIREMENTS

The tasks that students can accomplish electronically clearly demonstrate a need for every student and faculty member to have a minimum "baseline" standard of technology access. "Baseline" access includes:

- A *fast reliable personal computer system* equipped with a *modern operating system* that supports the *productivity and communication software* required for students to perform the tasks described in the above table. *CSU-wide standards* for basic productivity and communication tools are essential for universal collaboration, information sharing and workflow;

- A telecommunications infrastructure that supports the communication and collaboration tools required for students to perform the tasks described in the above table anywhere at anytime;
- Training to use this information technology; and,
- Operations and support to maintain these sophisticated systems.

Handheld devices such as personal digital assistants, "palm" PCs and others can help students, faculty and staff perform some of the tasks identified in this document. The tasks and associated requirements outlined above have provided guidance to workgroups charged with determining specifications for technological systems to support these minimum standards for CSU end-users.

REFERENCES

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NOTE: Comments and additions to this document are welcome. The lists of student, faculty, and staff activities, tasks and requirements will grow and change over time.