Technology Plan

May 2008

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Introduction/Executive Summary

This report has been done annually since 2001. Initially, this document was driven by the promised state money to fund the TCO model that was developed by the California Community College Chancellor's office. The Total Cost of Ownership (TCO) model outlines recommended numbers of computers, applications, support personnel and funding based on a number of criteria. The funding for the TCO model never came to fruition, but the model is still useful in evaluating how Cuesta is doing in regards to providing the appropriate technology to its students, faculty and staff. And as this report will show, it is also helps identify deficiencies in budgets for ongoing support.

The only deficiencies that exist when Cuesta is compared to the TCO model are:
- Number of support staff
- Age of computers
- Funding to maintain the network infrastructure

TCO Funding

Due to the California economy, the TCO model has not been funded as originally anticipated. In the FY02-03 State budget it was totally removed and has not been reinstated. This has created a hardship for everyone at the college. Since this time, new buildings with a large number of computers and servers have been built, but the funding for the necessary support staff and the necessary regular replacement of hardware and software is not available. The college continues to add student computer labs and increases the institution's dependency on technology without the appropriate number of support staff or providing regular recurring investment to keep the technology current.

In addition, in 2006 Cuesta began the implementation of an ERP system. This project (Project Oz) has added a huge on-going workload to the existing programming and network support staff. This project was started with the plan to increase staffing as required. This has not yet happened.

The backlog of projects for Computer Support staff continues to grow. As the backlog grows, infrastructure degrades and problems arise. The inability of Computer Support staff to respond to problems in a timely manner affects all computer users on campus; students and employee alike.

During the 2002 Accreditation visit the college received only three recommendations. One of the recommendations was to address the lack of appropriate of support staffing levels for new programs and facilities.

The State budget for FY02-03 cut additional technology funding which again, has not been reinstated. This funding was integrated into the college in such ways as; an Employee Learning and Innovation Center (ELIC), specialized technology training for Computer Services staff and a faculty mentor for Distance Education. Cuesta recently added a new position, Director of Professional Development and modified an existing position to

include the responsibility of Distance Education. These two changes indicate Cuesta's commitment to supporting these two programs.

Improvements Made Last Year

- Implemented the scheduled modules of Project Oz/Banner. Modules implemented in 2007 were: myCuesta for employees and students, Finance, and HR/Payroll
- Provided all currently enrolled students with Cuesta email accounts (@my.cuesta.edu)
- Installed the necessary servers and added to storage to support Project Oz/Banner systems
- Increased network bandwidth between SLO and NC campus
- Renewed six computer labs and migrated some the equipment to other labs
- Retired and replaced numerous old servers
- Completed moving of Student Services, Instructional Services, Purchasing, Computer Services and Library staff into the new expanded and remodeled 3100/3200 building on the SLO campus
- Wireless Internet available in both NC and SLO libraries to employees and students
- Wireless for classroom use in remodeled science classrooms on SLO campus
- Added video conferencing units (Polycom) to SLO and NC to support meetings and communication
- Provided regularly scheduled PC Support at South County on a regular basis
- Created numerous on-line training materials for Project Oz
- Began integration of newly re-organized Audio Visual staff into Computer Services processes to improve service to our customers

Current Status

Technology is integral into all departments at Cuesta. It has become a business critical utility like electricity and water. If it doesn't work as needed, it directly affects the students and employees.

Cuesta is in the middle of a multi-year project to implement a new college-wide administrative software system (Project Oz). This implementation will affect everyone at Cuesta; all employees and students. The success of this project is critical to Cuesta. It currently has wide college support. This project is adding an incredible workload to many offices on campus. This workload is *in addition* to the normal work that has to be completed on a daily basis. In addition, many departments have been affected by new buildings and remodels. This is a very stressful time for many people at Cuesta.

Some of the tools that are now or will soon will be available to faculty and students can enhance the communication between the groups and each other. The myCuesta portal will provide common communication tools for all courses.

MyCuesta and Project Oz will change the services that are available via the web. There will be a transition from our legacy system (PAWS and IRIS) to the new system found in myCuesta.

Currently Blackboard is the campus standard course management system that is supported for use by instruction. MyCuesta has a toolset that will be available to all courses in Fall 2008. Given this and the changes that have occurred in the marketplace in the past few years, it is time for Cuesta to re-evaluate the available products and if necessary, change their current campus standard course management system.

While discussing future technology needs with various college departments, a common request was to keep existing computers and software up-to-date, and to increase Computer Support staffing in order to adequately support the currently installed equipment. In looking at the ages of the campus computers it is imperative that a plan and a funding source for replacement computers be developed.

FY 2008-2009 Projects

These are the major projects planned for the coming fiscal year.
- Project Oz; complete the initial implementation of the core systems
- Theater Arts Building at SLO campus
- Evaluate Course Management Systems to determine campus standard for Distance Education use
- Move servers into new server room in 3180
- Generator backup for new server room
- Add more wireless network access at SLO and NC campuses
- Improve customer experience with Facilities, Audio Visual and Computer needs

Critical Technology Challenges

These are the most significant issues currently challenging the health of computing technology at Cuesta College.
- Implement a hardware and software solution to replace the HP3000 mainframe and its software applications (Project Oz). This requires broad participation from many departments on campus. A critical yet non-technical piece of this is helping people deal with change.
- Refresh the wired network at both campuses. Many components of the network infrastructure at the SLO campus were purchased with one-time funds. Many of these components are obsolete and not supported by the vendor. As time passes, additional equipment will also be in this state.
- Provide an appropriate level of Computer Support for all areas on campus
- Refresh desktop computers every 3-4 years as outlined in the TCO model
- Support new construction occurring on SLO and NC campuses
- Support Distance Education offerings

Cuesta versus TCO Model Summary

Appendix A provides a summary table comparing Cuesta versus the TCO model minimum recommendations. The table shows that Cuesta meets or exceeds most of the requirements for providing technology to administrators, staff, faculty, and students. Cuesta provides adequate DSPS technology availability. Cuesta's major deficiency is in the following areas:

- Computer support personnel
- Replacement of hardware (computers and servers) in a timely manner
- Funding for network infrastructure

One metric that Cuesta exceeds, exacerbates the areas that we don't meet the minimum recommendation. Cuesta provides over 200% the number of computers for student use than the TCO model's minimum recommendation.

Support Personnel

The TCO model shows that the computer support staffing for Cuesta should be 30 FTE. As of March 2008 the computer support staff at Cuesta is 12 FTE.

Age of Computers

As of March 2008, the ages of the computers were as follows:
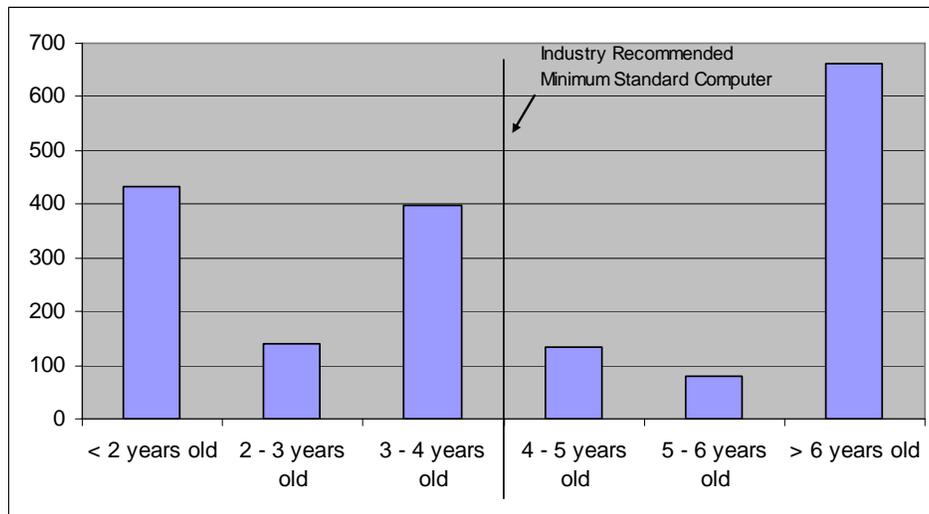
- The spikes in the age/inventory correspond to new or remodeled buildings.
- The cost to support computers over 5 years old increases dramatically

It is estimated that once all the student lab computers were in the age range of 3-4 years, the annual budget required to replace the computers according to the model is $250,000 -

$375,000 (assuming no computer migration). There would be a large initial cost to replace computers that were older than 5 years.

<u>Funding for Network Infrastructure</u>

The TCO model indicates an annual budget of $550,000, the current annual budget for our campus LAN is $42,000. Cuesta relies on one-time funds from new buildings to refresh infrastructure. However, buildings are amortized over twenty to thirty years. Network equipment is amortized over five to seven years and is obsolete at ten. The core of our infrastructure is almost fifteen years old.

Service Uptime Expectations

Cuesta College Computer Services maintains the servers for a large number of software applications and services used by both internal and external customers. Ideally, these servers, and therefore the applications and services that run on top of them, would be available or "up" all the time. However, this is not realistic due to a number of reasons relating to the age and architecture of the systems including unexpected software and hardware failures and the need for periodic maintenance. Cuesta College Computer Services make the best effort to provide the highest level of availability for all of the services we support. However, we recognize some services are more critical than others.

Cuesta College Computer Services has and will continue to apply their limited resources to guarantee uptime for core services. Other services are acknowledged to be either less critical *or* substantially more complex such that expanding uptime expectations is not realistic with the resources available. This section documents what level of uptime users of the various services may expect. Because Computer Services is constantly in the process of upgrading systems and applications, we also distinguish between *current* and *targeted* capabilities. These categories are adjusted annually.

Information regarding the availability of data stored on the network is presented under the section Data Safety.

Definitions

The following categories and terms provide the basis for assessing uptime objectives.

Reliability Levels:
- *Fully Reliable* - service is available at least 99.9% of the time
- *Generally Reliable* - service is available at least 99.0% of the time
- *Moderately Reliable* - service may be available less than 99.0% of the time

Up Time Window:
- *24/7* - twenty-four hours a day, seven days a week = 8760 hours/year
- *Instruction Hours*
  - Mon – Thurs, 7:30am – 10:00pm;
  - Fri 7:30a – 4:00pm;
  - Sat 8am – 2:00pm;
  - 42 weeks (instructional weeks) = 3045 hours/year
- *Business Hours*
  - Mon – Fri, 8:00am – 5:00pm;
  - 52 weeks = 2340 hours/year

Acceptable downtime (Reliability versus Uptime)

Acceptable downtimes are the number of hours within the uptime window during which the indicated service may be unavailable over the course of the year and still be considered

to have met its uptime target. For example, if a server is deemed Fully Reliable during Business Hours, then it should be down for less than two hours a year during business hours. Note that any downtime outside the uptime window (outside of Business Hours in this example) does not affect the reliability rating. Our goal is that all services should fall in the Fully Reliable or Generally Reliable category.

Uptime Window	Maximum Downtime to Maintain Rating		
	Fully Reliable	Generally Reliable	Moderately Reliable
24/7	9 hours /year	84 hours/year	Best effort
Instructional Hours	3 hours/year	30 hours/year	Best effort
Business Hours	2 hours/year	20 hours/year	Best effort

Note that the list of the allowed downtime hours for the various service level categories is intended to convey an expectation of availability. These definitions should not be construed as a guarantee of uptime for the services listed below.

External Services

External services are those services that are available from off campus to both the general public as well as Cuesta students and employees.

Primary Website (www.cuesta.edu)
>   Current: Generally Reliable 24/7
>   Targeted: Fully Reliable 24/7
>
>   This service is dependent upon the Internet link and uptime of several local systems. The primary web server runs on a "virtual" server which can be relocated to a backup physical server should the primary physical server fail. However, the biggest threat to the uptime of the primary web site is local electrical power failure. Without generator backed power, we do not expect downtime to be less than 9 hours per year to achieve our goal of Fully Reliable.

Intranet Websites (academic, library, PAWS etc.)
>   Current: Generally Reliable 24/7
>   Targeted: Fully Reliable 24/7
>
>   The intranet sites have the same dependencies on Internet link, local systems and local power as the www the site listed above so guidance is the same. A distinction though is that some of these sites will be retired or be folded into www or myCuesta, discussed below.

myCuesta Portal (my.cuesta.edu)
>   Current: Generally Reliable 24/7
>   Targeted: Fully Reliable 24/7
>
>   This application (part of Project Oz) is still new to the college having initially gone into production just over one year ago in March 2007. We have tuned maintenance

schedules and operational processes to achieve General Reliability. (Part of the maintenance process is a scheduled downtime early Sunday morning each week which is excluded from downtime calculations.) This is a substantially more complex system than the sites listed above so maintaining Full Reliability will be a challenge. However, even if we overcome these challenges, we do not expect to achieve this goal without generator backed power.

It is worth noting the myCuesta portal is not as "public" as the primary website as it is accessible only to members of the Cuesta College community – students, faculty, staff, and administrators. Outages are globally less visible but nonetheless critical to many users within the college community.

Student Email (ability to read email and send email)
         Current: Generally Reliable 24/7
         Targeted: Fully Reliable 24/7

Cuesta College has partnered with Google to provide all students with a myCuesta email account. This decision was made in consideration of the substantial processing and storage requirements that would be required to support all current and recent students – currently greater than 25,000 accounts. A great benefit of this partnership is that the student email service is free to Cuesta College. Moreover, nearly all of the servers that provide this service are offsite, hosted by Google and maintain very high uptime. However, login authentication for the student email is dependent upon the myCuesta system discussed above. Therefore, as with myCuesta, the target of Fully Reliable will be inhibited by lack of reliable power.

Employee Email (ability to read email and send email)
         Current: Generally Reliable 24/7
         Targeted: Fully Reliable 24/7

This service is dependent upon a clustered pair of servers, redundant mail gateways, substantial storage resources, the Cuesta LAN, and edge servers that present the application to external users, i.e. Citrix and Outlook Web Access. The increase of the quantity of email and attachments sent and received by Cuesta employee's continues to tax the available storage and processing power. In order to accommodate the increasing demand for email resources, we are planning another server hardware upgrade in the next year. (The last upgrade was in 2006.) Yet again though, the target of Fully Reliable will be inhibited by lack of reliable power.

List Server
         Current: Generally Reliable 24/7
         Targeted: (currently meets reliability target)

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This service is expected to be decommissioned in the coming year in favor of features found in myCuesta including and especially, Course Studio, an online collaboration environment for faculty and students.

Internal Services

Internal services are those services generally available only to Cuesta students and employees while on campus. Note that some of these services (e.g. Network File Shares) are also available off campus but for employees only.

Student Labs and Classroom Computers
<blockquote>
Current: Fully Reliable during Instruction Hours
Targeted: (currently meets reliability target)

The uptime for these instructional services is based on a large collection of facilities including servers configured solely for Instructional use, the Cuesta LAN, and dedicated, focused support of the approximately 1200 desktop computers used by students. Historically, virus threats have been the biggest threat to availability of these critical services. Computer Services has mitigated virus threats in recent history by improving the frequency and reliability system patches and by limiting student access to only the curriculum-oriented software installed in that lab. In the classrooms based on Mac OS, we have implemented net-booting technology that results in a "clean" system at each boot-up. These efforts have resulted in substantial improvements in uptime for student-use computers. Based on the uptime history over the last year these services now meet their target for Fully Reliable during Instruction Hours which we expect to maintain going forward.
</blockquote>

Reflection (access to HP3000)
<blockquote>
Current: Fully Reliable during Business Hours
Targeted: (currently meets reliability target)

This service is dependent on the uptime of the HP3000 itself and the Cuesta LAN. Both the HP3000 and the Cuesta LAN already enjoy excellent uptime performance. In the past, unacceptable performance on the HP3000 has occurred during the beginning of each semester as students register. However, the next student registration will be on the new Banner administrative software system designated by Project Oz. The HP3000 is expected to be fully retired within two years.
</blockquote>

Banner
<blockquote>
Current: Generally Reliable during Business Hours
Targeted: Fully Reliable during Business Hours

This application (also part of Project Oz) is still new to the college. The Fiscal Services, HR/Payroll, and Purchasing modules are already in production. The Financial Aid and Student modules will go live in the summer 2008. As this system is new and still being expanded, we are tuning system configuration and
</blockquote>

maintenance schedules. For this reason, the current rating is Generally Reliable while the long term target is to make this system Fully Reliable during business hours.

Network File and Print Shares
      Current: Fully Reliable during Business Hours
      Targeted: (currently meets reliability target)

These services are based on clustered servers, substantial storage resources, the Cuesta LAN, and edge servers that present file sharing to external users, i.e. Citrix. In 2006 we deployed file share quotas to all users and groups to control the amount of space that can be used. This produced a dramatic improvement in file share availability as single users or departments can no longer degrade the system by overusing the available space. We expect to continue to achieve the targeted goal of Fully Reliable during Business Hours.

Departmental Applications (SARS Grid, ATI Filer, LiveScan, etc.)
      Current: Generally Reliable during Business Hours
      Targeted: (currently meets reliability target)

This category encompasses a vast range of systems from small desktop database applications to statewide criminal reference systems. All of these systems are required to maintain external vendor support for the application. Most that store data locally store that data on our MS SQL server which has excellent reliability and data protection. The ongoing deployment of Project Oz will eliminate the need for some of these standalone third party systems.

Video Conferencing
      Current: Generally Reliable during Instruction Hours
      Targeted: **(Improved - currently meets reliability target)**

In the last year Cuesta College made a substantial capital investment to replace all but one of the very old video conferencing systems. Accordingly, we now have the ability to run three concurrent video conferences between the NC and SLO campuses for either instructional or administrative use. Both the Math and the Business Education departments have used video conferencing to classrooms at both campuses. Video conferencing is also used to join administrative meetings (committees, department and union meetings, etc.) across both campuses.

myCuesta Wireless Access
      Current: Generally Reliable during Instruction Hours
      Targeted: Fully Reliable during Instruction Hours

Computer Services deployed Cisco's second generation enterprise wireless system as part of the SLO Library Expansion project in Fall 2007. This service was made

available to the library at the NC campus at the same time. Since students use the same login, the wireless system was packaged as part of the myCuesta portal.

We expanded myCuesta wireless to the 2100/2200 buildings as part of the Science remodel project in Spring 2008. And we have plans and are scheduling funding to add myCuesta wireless to other locations at the SLO campus: student cafeteria (5000), ECE (4000), Nursing (2500), Administration (8000), and others.

In general, the myCuesta wireless system has been extremely reliable for student public access. However, we have encountered login issues in the student labs with twenty or more laptops. We have also experienced failed security associations for staff users with certain laptop configurations. (Staff wireless access requires higher level security policy because it allows direct access to critical resources on the network.) Both of these issues are under investigation. We expect to resolve these issues by Fall 2008 and will then upgrade the first generation Cisco wireless system at the NC AHMS building, deployed in Summer 2005. Once these are done we expect to achieve Full Reliability during Instruction Hours.

Internet Access

      Current: Fully Reliable 24/7
      Targeted: (currently meets reliability target)

This service is dependent almost solely on the performance of external entities. We partner with SLO County Office of Education, Cal Poly, and CENIC to deliver Internet connectivity. This service is already very stable though on rare occasion outages do occur. Most often, these outages are a result of vendor or partner error. The best way to protect against this would be to procure a redundant Internet link which is not economically viable at this time.

Data Integrity

In addition to being available, computing and information systems are also expected to present consistent and correct data to the user. To maintain this expectation requires efforts at many levels within an IT enterprise, from the top of the application stack (applications should control and verify input to avoid "garbage in garbage out") to the bits stored on magnetic storage (they cannot change or disappear.) This section focuses on the lower layers – storage and backups.

Cuesta College Computer Services maintains approximately six terabytes (six trillion bytes) of online data for the college community. This data is stored within our Storage Area Network (SAN) containing nearly one-hundred hard drives using advanced RAID techniques to improve performance and availability. Additionally, this data is backed up on a regular basis to alternate disks and to tape. Over the course of a week, our backup regimen produces an additional three terabytes of data to be stored offline.

This is the second year running our new backup solution, having upgraded software in 2006 and hardware in 2007. These investments have increased the accuracy and reliability

of our backup process across the board. As an outcome, we now enjoy a high success rate for user requested short-term data restoration (e.g. to restore deleted files or mailboxes.). Fortunately, we have not had to use the backup system to recover from serious system errors. However, this possibility is the primary reason for the substantial investment we have and continue to make in highly redundant storage systems and multi-layered backup solutions.

The frequency of backups is outlined below according to category of system.

Network File Shares (P, G, Q etc drives)
>   The shared network drives are backed up to disk several times a day and to tape on a nightly basis. Many systems are backed up to disk facilitate rapid recovery. The backups to tape protect against media failure as well as allow relocation to a different building which occurs on a weekly basis. Altogether, these systems and processes provide multi-layered resiliency to a variety of failure modes.

Databases
>   The database systems used by the HP3000, Banner Administrative Software (Project Oz), and SQL-based departmental applications are backed up on a nightly basis. However, nightly backups mean that a hardware or software failure could require restoring the data to the backup from the previous day. This can mean loss of up to a full day's updates. Both the Banner and SQL database backup systems can improve upon this in *some* situations (depending on the nature of the failure) by providing finer grained restore points. Banner is able to rollback from software errors to a specific transaction. The SQL database also has partial backups to disk every two hours. As the data stored in both of these systems is critical to the fundamental business of the college, great care is taken to ensure that no records are lost.

Employee Email
>   The Microsoft Exchange system used by Cuesta College employees contains mission critical data for many users. In addition to storing all online email for employees, the system also stores calendar data, tasks, memos and contacts. Because this data contains the essence of so many work flows and interactions throughout the college, the Exchange databases (along with the Banner and SQL databases) are given the highest levels of protection. As with the SQL databases, the Exchange database has partial backups to disk every two hours. On top of this, backups to tape are performed nightly and tapes are rotated to a different building weekly.

Server System State
>   In addition to the user data listed above, Computer Services maintains an enormous set of data that is solely related to server operating system configuration. While this data is never directly visible by the user community, hardware or system failures that destroy (portions of) this data would take much longer to recover from if not backed up. Accordingly, Computer Services backs up all servers on a nightly basis. For many servers, snapshots of the system state are taken every four to eight hours. These recovery points provide a safety net when patches or other system events go badly.

Email Reliability

While generally reliable, emails sent or received to outside entities have no guarantee of delivery. Internet email is sometimes not delivered due to several factors: the various service interruptions discussed above, viruses or spam filters that may indicate a false positive, and the reliability of systems controlled by other entities. Internal email (mail sent from one cuesta.edu account to another) is substantially more reliable because there are fewer external dependencies.

It is also important to note here the exorbitant and yet still increasing cost of maintaining appropriate spam and virus filters for email. In particular, the cost of controlling spam has skyrocketed in the last few years due to an increase in both the amount and sophistication of spam email. Because spam is hard to unambiguously define for both users and system administrators, the filtering solution is never perfect and therefore requires regular communication between technical staff and the user community. As a result, Computer Services has been required to dedicate substantial system administrator and user support/user training resources to ensure the email that reaches Cuesta employees is mostly legitimate and not spam.

Disaster Recovery Plan

Computer Services does not have but should develop a comprehensive Disaster Recovery Plan. A properly developed plan would identify:
- Mission Critical Processes
- Procedures, Priorities, and Personnel for implementing the plan
- Recover levels and alternatives
- Testing procedures
- Updating procedures
- Personnel and Training required

A complete Disaster Recovery system is a huge undertaking. Over time we intend to improve our disaster recovery posture incrementally.

For example, Computer Services has long maintained "Disaster Recovery Binders" which are simple three-ring binders that contain a collection of important information. Multiple copies of these binders are kept at the college and offsite. One binder is located in Computer Services, one is located in the EOC on SLO campus and two are located off-site at Computer Services Manager's residences. The information in these binders is updated on a regular basis.

This past year the network bandwidth between SLO and NC campuses was increased 2.5 times. This increase will provide the opportunity in the future to have off-site disk backup of data and potentially a second, disaster recovery data center for critical services.

Service Uptime Expectations Summary

As technology becomes more embedded in the day-to-day operations of Cuesta College, it is increasingly important that it be available when necessary. Cuesta College Computer

Services works hard to meet this goal for all of the services it supports. However, it is important to understand that information technology, like all other technologies, is imperfect and subject to occasional failure. Even the best-funded information technology departments cannot guarantee 100% uptime. Therefore, the challenge for Cuesta is to apply the limited resources available to achieve highest availability possible for the most critical services.

The goal of this section is to advise users of the relative reliability and priority of the various technologies supported by Computer Services so that users can make decisions about which technologies are appropriate for various purposes. We hope that by explicitly communicating the limitations of the technology, users will be able to more reliably and effectively incorporate that technology into their own work.

Students

Cuesta far exceeds the minimum standards set in the TCO Model for computers available to students. On the surface this would seem to be a positive statement. However, the average age of computers is also above the Chancellor's model. Over time Cuesta has increased the number of labs instead of replacing the computers in existing labs. In the discussions with the Division Chairs across campus the biggest concern is keeping the technology current; which includes both hardware and software. The absence of a funded plan to keep student lab computers and software refreshed at regular intervals is critical.

Row A8 in the following table shows a large number of computers that are now in the 6 years and greater category. The TCO recommendation is a 3-4 year refresh cycle. Some of these labs are unable to effectively run the necessary software. In addition to curriculum software, the vendors continue to update the Operating Systems (Mac OS and Windows) and office software (Word, Excel, etc). These new versions of the software usually require newer hardware.

Appendix B of this document outlines the process that the Technology Committee developed for determining what student labs get updated each year. On a case by case basis the ability to migrate computers from one lab to another is evaluated.

Wireless access for Students

In Fall 2007 Cuesta provided wireless access to students at both the SLO and NC libraries. This happened at the same time that myCuesta was made available to students. Accessing the Internet requires the students to use their myCuesta login. The staff identified to provide students with technical support was the lab aid in the open lab at the SLO campus and Library staff at the NC campus. We are pleased to say that the service has been reliable and support costs minimal. Fortunately the support for this service to students has been minimal.

Now that the infrastructure is in place, the next steps are:
- Update the wireless that was originally installed in NC Allied Health Math Science to this new system
- Identify other student gathering areas where wireless access would be appropriate, prioritize, and implement

With this new services available to the students, usage in the open lab needs to be evaluated to determine the future appropriate equipment and configuration of this space. One need that isn't served by this service is printing. This too needs to be considered with evaluating usage and configuration of the open lab.

Storage media for Students

Some students still depend on floppy disks for storing their class files and moving them between computers. This technology is obsolete. Some instructors have moved their students to using flash drives (aka thumb drives). This is the media that all students need to use. Many vendors are removing the floppy drive from their standard hardware configurations. Flash drives have much higher capacity and higher reliability.

Managing Curriculum Software

In Summer 2004 we deployed technology that allows Cuesta to manage concurrent software licensing and therefore share software licenses across divisions. This has saved the college money. Example: 37 concurrent licenses of Photoshop is purchased, at any one time up to 37 student lab computers (NC and SLO) can run Photoshop simultaneously. When the 38th person tries to run the application, an error message displayed. These 37 licenses can be available to any lab that teaches the application, including the student open lab. With appropriate scheduling, multiple classes can share the cost of the software licenses. There then becomes a policy issue of how departments split the cost of software licenses.

A project to get an inventory of curriculum software was initiated by Vice President of Student Learning. This project was handed off to the Technology Committee with the initial work assigned to Computer Services. After the initial work was completed the Technology Committee reviewed the results. Given other priorities at Cuesta, this project was put on indefinite hold. There is still a need for this, but just not a realistic priority with current staffing and workload.

TCO Requirements

	Category	Minimum Baseline	Cuesta Status
A1.a	PCs for student	One PC will be dedicated to student use for every 20 FTES.	FY 07-08: 9225/20=461 Actual = 1079 Exceeds minimum standard
A1.b	PCs for student with assistive technology	10 percent of all computers in this category will be configured with assistive technology to provide increased access to students with disabilities.	10% of 1000 = 100 45 available in High Tech All other labs have at least 1 DSPS station Meets minimum standard

	Category	Minimum Baseline	Cuesta Status
A2	Printers	One printer rated at 8 ppm or greater will be dedicated to every 30 student computers.	At least 1 in every classroom Self-service print pay stations available in SLO Library and High Tech open lab. Meets minimum standard
A3	Office Software	80 percent of student computers will have access to word processing, spreadsheet, and presentation software.	Site license makes it available. It is up to the instructor to determine if it is needed or not. Exceeds minimum standard
A4	E-mail	Under Review	Email accounts created for all active students No Standard
A5	Internet	80 percent of student computers will have access to the Internet via a browser.	All computers have Internet access available. Exceeds minimum standard
A6	Virus detection software	Each student computer connected to the Internet will be protected by anti-virus software.	Site license anti-virus software is purchased and installed Meets minimum standard
A7	Student Online Services	80 percent of student computers will have access to all student online services provided by the college.	All computers with Internet access have access to Cuesta web site. Exceeds minimum standard
A8	Refresh rate and currency of computers	PCs will be replaced on a three-year basis. This requirement is consistent with industry practices.	260 < 2 year old 84 2 - 3 years old 243 3 - 4 years old 12 4 - 5 years old 51 5 - 6 years old 429 > 6 years old **Below minimum standard**
A9	Online Library and Learning Resources	80 percent of student computers will have access to electronic library databases and the library card catalog.	All computers with Internet access have access to Cuesta web site, which includes library site. Library databases available from off campus computers Exceeds minimum standard

Computer Labs: Current Status – SLO

Department/Room	When Purchased	Qty	Comments
Business Ed - 4111	Fall 2007	30	
Business Ed – 3412	Fall 2007	30	
Business Ed – 3413	Fall 2007	30	
CAD – 3406 and 3403	Summer 2006	32 + 6	Because 3400 Open Lab computers could no longer support CAD/Architecture students, a separate dedicated space was created next to the Open Lab
Electronics - 4501D	January 2001	10	Stand Alone – outside our firewall
Electronics – 4501E	January 2005	12	Stand Alone – outside our firewall
Electronics – 4401	Unknown	23	Stand Alone – outside our firewall
Nursing – 2501	July 2001	18	Combination lab and lecture room – Age of the hardware is affecting usability of the lab – Want to reconfigure room and only have 4 computers
Nursing – 2502	July 2001	4	Age of the hardware is affecting usability of the lab
Math - 2205	August 2003	32	
Math - 3301	October 2001	33	Plan to replace Summer 2008
Math - 3300	October 2001	6	Will be de-commissioned Summer 2008
Math Lab 2601	December 2005	9	
English/ESL - 6105	October 2001	29	
English/ESL - 3304	October 2001	28	
English - 3300	October 2001	22	
Art - 7138	August 2006	21	
Art – 7108	December 2003	4	Needs to be replaced
Art – 7175	December 2003	16	Needs to be replaced
Music - 7139	July 2001	20	Critically needs to be replaced. (Systems are not currently used due to age of the hardware.)
Music Open Lab - 7137	July 2001	4	Critically needs to be replaced. (Systems are not currently used due to the age of the hardware.)
Journalism - 6111	Spring 2007	10	
Foreign Language – 6103	August 2003	20	
Broadcasting – 6101	Various ages	8	Part of digital video/broadcasting equipment
Radio Lab – 6102	Various ages	9	
DSPS/ ATC - 3305	August 2002	17	Needs to be replaced
DSPS / Academic Support/Tutoring - 3300	October 2001	23	Needs to be replaced

Department/Room	When Purchased	Qty	Comments
Open Lab - 3400	October 2001	78	Systems have performance issues with some of the software. Need to evaluate future configuration and hardware needs now that student wireless is available
Assessment – 3414	July 2005	27	
Physics Lab 2101	January 2008	14	
Chemistry Lab - 2105	January 2008	16	2104, 2105, 2107 share 2 sets of laptops
Chemistry Lab - 2104	January 2008	16	2104, 2105, 2107 share 2 sets of laptops
Chemistry Lab - 2107	January 2008		2104, 2105, 2107 share 2 sets of laptops
Geology Lab – 2108	January 2008	16	
Biology AT Lab - 2201	Spring 2002	30	
Biology Lab – 2204	Spring 2002	2	
Biology – 2202	Fall 2007	12	
Library Technology – 3411	October 2001	25	Needs to be replaced
Library	August 2007	30	
3100 lobby	March 2007	12	.
EPOS	July 2003 March 2007	8 laptops 3 desktops	
Transfer Center	March 2007	10	
Fitness Lab - 1113	Various ages	1	Not used much.
IPD/Community Programs Lab – 4740	January 2001	24	Needs to be replaced
Career Connections – 5310	October 2001	9	

Department/Room	When Purchased	Qty	Comments	
ELIC/PDC 3144/3145	March 2007	12 14		
Auto Tech	Summer 2006	4		
Lecture Machines	Varies	52	3	< 2 year old
			9	2 - 3 years old
			14	3 - 4 years old
			2	4 - 5 years old
			4	5 - 6 years old
			20	> 6 years old

Computer Labs: Current Status – North County

DEPARTMENT/ROOM	When purchased	Qty	Comments
Biology AT Lab – N2438	May 2005	34	28 desktop and 6 laptop
Geology/Bio Science Lab – N2436	May 2005		Share laptops with Physics Lab – N2409
Biological Science Lab – N2440	May 2005	20	Laptops
Chemistry Lab – N2406	May 2005	24	
Allied Health Lab – N2407	May 2005	4	May switch to wireless laptops due to space constraints
Math Classroom – N2408	May 2005	43	
Physics – N2409	May 2005	12	Laptops for Physics;
CAOA Lab – N2411	May 2005	42	
Math Computer Lab – N2801	May 2005	16	
N5004 (shared between English, ESL, Academic Support, Foreign Language and CAD at North County)	August 2002	25	Age of these computers is causing an issue with what classes a can be taught in this room
Tutor Center – N4003	Varies	3	Need hardware to match.
Library	June 2007	22	
DSPS - N3024	May 2005	2	

DEPARTMENT/ROOM	When purchased	Qty	Comments		
Transfer Center – N3026	2000(?)	4*	* same image		
Student Services – N3026C	2000(?)	3*	* same image		
ESL – N3032	2000(?)	2*	* same image		
ELIC	2005	4	Needs to be replaced		
CalWorks/Basic Skills N4001	June 2007	22			
Lecture Machines	Varies	22	0	< 2 year old	
			12	2 - 3 years old	
			0	3 - 4 years old	
			0	4 - 5 years old	
			10	> 6 years old	

Additional Lab Planned or Requested

North County

Learning Resource Center	2008-2010	This building will contain • Permanent Computer Services office and server room • Open Student Computer Lab in Library • Writing Computer Lab - DSPS • Learning Skills Computer Lab - DSPS • PDC Lab • Faculty / Staff Offices
Trade and Technology	2008-2010	This building will contain • CAOA/CIS Computer Labs • Electronics Lab • Auto Tech • Viticulture • Welding • Construction • Faculty Offices
"Open" lab	Requested	Previously N5004 was available for open hours. This access has since gone away. There is a need for an open lab for student use.
Music Theory lab	Requested	No space has been identified
Dental Hygiene	TBD	

Humanities	TBD	
Early Childhood Education	TBD	

San Luis Obispo

Theater Arts Building	Spring 2009	• Infrastrucure for theater production • Auto CAD/ scene design and blue printing (5 stations) • Box Office system
Engineering	Requested	Architecture program is growing and will soon be unable to share lab space with CAD. A computer lab will be needed
Interior Design and Fashion Design	Requested	These programs use the CAD lab. Due to usage, they will soon need their own lab
Biology – 2204	Requested	Currently sharing laptops with 2104 and 2105; due to curriculum needs, this isn't working well
Chemistry – 2107	Requested	Currently sharing laptops with 2104 and 2105; due to curriculum needs, this isn't working well

Computer Labs that need Replacement

Appendix B outlines the process for allocating identified funds to replace or upgrade computers in student computers labs. The following is the list of labs that will be considered with funding available in FY 08-09 (not in priority order).

Department/Room	When Purchased	Qty	Comments
Open Lab - 3400	October 2001	78	Need to evaluate future needs now that student wireless is available
ELIC - NC	2005	4	Needs to be replaced
Lecture Machines	Varies	40	Many lecture room machines are old. Some number of these needs to be replaced. Both SLO and NC campuses.
Music – 7139	July 2001	20	Systems not used due to age of the hardware
Music Open Lab – 7137	July 2001	8	Systems not used due to age of the hardware
N5004 (shared between English, ESL, Academic Support, CAD)	August 2002	25	Age of hardware is limiting classes that can be offered in this room.
Broadcasting – 6101	Fall 2001	8	Need to be campus standard and of like hardware for Computer Services to support. The department wants to move in this direction
Radio Lab – 6102	Fall 2002	9	Need to be campus standard and of like hardware for Computer Services to support. The department wants to

Department/Room	When Purchased	Qty	Comments
			move in this direction
Nursing - 2501	July 2001	18*	They want to reconfigure room and only have 4 computers*
Nursing - 2502	July 2001	4	
DSPS / Academic Support/Tutoring	October 2001	23	Needs to be replaced
NC Transfer Center – N3026	2000(?)	4*	*same image
NC Student Services – N3026C	2000(?)	3*	*same image
NC ESL – N3032	2000(?)	2*	*same image
DSPS/ ATC - 3305	August 2002	17	Needs to be replaced

Students Summary

The new and remodeled buildings on both the San Luis Obispo and North County campuses have allowed Cuesta to provide computers for student use. The on-going issue is funds to renew the hardware and software on a regular basis. It is interesting to note that we are over double the TCO requirement for computers for student use, with many more planned or requested and we continue to be dramatically under the TCO requirement for Computer Support staffing. The piece of technology that is equally as critical but not obvious is the servers and infrastructure that also must keep pace with changes in technology to meet the curriculum needs.

Faculty/Instructional Departments

Most courses have integrated some level of technology into their curriculum. Many courses now incorporate multimedia and Internet into the lecture, labs, and assignments. The number of courses offered via Distance Education modality continues to increase. The college has identified Distance Education as an area to grow in the coming years.

Starting Fall 2008 myCuesta will provide additional functionality to employees and student. Each course in the class schedule will automatically have a course shell created that will have communication tools that can be used by both instructors and students. In addition, myCuesta will provide the instructors with functions that are now a part of IRS and additional functions.

The age of instructors' computers (see B8 in the chart below) is an area where Cuesta is below the TCO metric. If Cuesta expects instructors to use multi-media to enhance education then they need the necessary tools. The new PDC on the SLO campus provides computers and support staff to help with special projects. These computers are not a replacement for appropriate technology in faculty offices.

South County Centers

Status

South County instruction takes place in two primary leased facilities, Arroyo Grande High School (AGHS) and Nipomo High School (NHS). The larger of the two programs is at AGHS where over 40 sections of classes were taught in Fall 2007. The AGHS classrooms have only overhead projectors. Cuesta College provides portable data projector/laptop computer units for instructor use. Since there are only 5 units available, instructors must pick them up and drop them off every evening. This is a less than satisfactory situation. Cuesta uses two AGHS computer labs in which LMUSD provides the technical support.

 The second location, NHS, opened in Fall 2002 and has one dedicated modular Cuesta College Office to support Cuesta courses at that location. There was a joint project between LMUSD and Cuesta to install a shared computer lab. This lab is solely support by LMUSD staff. Given limited resources and much stronger enrollment patterns at the Arroyo Grande site, the strategy for expansion of programs at Nipomo High School is being evaluated.

Issues

Cuesta College's South County Center instructors strongly request classroom technology in line with resources on the San Luis Obispo and North County campuses. At this point many instructors depend on such technology for their lectures. As more technology is installed, the support staff and infrastructure must be in place in order for these programs to succeed. The downside of instructors becoming dependant on these tools in the classroom is 1) When leased classrooms such as AGHS or NHS are used, ownership/service is an issue and 2) There needs to be funding to replace them when they fail.

Cuesta is currently investigating alternate sights in South County to lease and provide the necessary services. When a new site is identified the staffing to support this new facility will need to be identified.

Distance Education

Courses offered via Distance Ed modality continues to expand at Cuesta. In Spring 2008, 59 courses with 79 sections were offered. The classes usually fill early in the registration process. The process for developing these courses has been incorporated into the regular curriculum development procedures. In addition, many hybrid courses are offered (mainly traditional classroom with some distance education components). Some of these hybrid courses evolve to complete Distance Education modality. The technology used for these courses varies, they include:

- Blackboard for course management
- Course material provided by the publisher
- Course material developed by the instructor and housed on Cuesta servers
- Course material developed by the instructor and not housed on Cuesta servers

In 2000-2001 Cuesta evaluated the available distance education course management tools and picked WebCT as its campus standard. Since that time WebCT has merged with Blackboard. Given the changes in the marketplace it is time for Cuesta to again evaluate the viable vendors and determine the campus standard system. The job description of the Director of Library/Learning Resources was recently updated to include the responsibility of Distance Education. This now gives distance education a place on the Cuesta organization chart, something that was previously lacking. Some areas that need to be addressed in the Distance Education arena at Cuesta are:

- A clear process for faculty to follow to get their first course online
- Training on the campus standard technology
- Consulting on the pedagogy and other non-technical issues

MyCuesta has Course Studio built in. This toolset is not as robust as a Course Management system (Blackboard), but offers a number of communication tools that will be available to all instructors. This will be implemented for Fall 2008 classes. Having this toolset available to all faculty may increase the number of courses that are considered hybrid and may provide a smooth path for those wanting to teach on-line. This toolset may also lessen the number of instructors who use our Blackboard license if the tools in Course Studio meet their needs.

Changes in the Classroom

Some departments have adopted selected new technology in their classrooms. In some cases this starts out in one department and over time is adopted by others and may

eventually become campus wide. In other instances the technology is department specific and does not expand beyond that.

In January 2008 Cuesta made an organizational change, moving the previously named Instructional Technology Services (ITS) department that reported to the Director of Library/Learning Resources to Computer Services. Previously if there was a problem with classroom technology it was not clear to the users which department to contact, Computer Services or ITS. ITS had responsibility for the audio/visual components connected to the computer, while Computer Services was responsible for the computer. This new organization will give the users one point of contact when problems occur in the classroom.

Currently there are over 100 classrooms at NC and SLO campuses with computers and data projectors, 43 which also have Elmos connected. The goal is to have a consistent user interface for the users, so the need for re-training for different classrooms isn't necessary. This will take some time to implement in all classrooms not only due to funding and priorities, but the available time in classrooms and available staff.

E-Learning

In Spring 2004 some instructors began using e-learning hardware and software in some classrooms. E-learning allows for student to respond to quizzes or surveys in the classroom electronically and have the results tabulated and displayed instantaneously (like the "Millionaire" show). This hardware was installed in some classrooms at both SLO and NC campuses. The product that is currently being used needs to be evaluated. The vendor's requirement for implementing upgrades does not work in our environment. Instructors will be working with Computer Services staff to find a product that meets both the needs of the instructor's and the support staff.

Smart Boards

The Math faculty uses "smart white boards" on the SLO and NC campuses, white boards use computers and data projectors to display the content. The content can then be saved for future reference.

Impatica

Impatica is a software application that has been used by the Nursing department. It compresses PowerPoint files so students can easily access them via the web. Through their initial use, Cuesta determined that it would be a good tool for campus-wide so a site license was purchased.

Polycom

Cuesta has begun offering classes taught at both SLO and NC campuses simultaneously by the same instructor via real-time, multi-channel video conferencing technology (aka Polycom). This is currently in its infancy. For this to flourish some policy decisions will need to be made, such as: dedicating rooms for this technology, room scheduling, on-going funding, and technical support.

<u>Wireless access</u>
Wireless access for laptop computers was implemented in the newly remodeled science classrooms on the SLO campus. The goal is for this implementation to be replicated in other labs as the opportunity arises.

Other Changes

<u>Podcast</u>
Cuesta has not yet offered this technology to instructor for their class content. Some instructors have expressed interest. The new PDC has computers and a room that will support faculty who want to create sound and video files.

<u>Online Office Hours</u>
The Chancellor's office has funded a product called CCCConfer that provides the technology to accommodate online office hours. The tools allow sharing of files, PowerPoint's, white board, etc.

Lecture Machines

The details and ages of the lecture machines can be found in tables on pages 18 and 20 in the Student section of this document. The goal of Computer Services is to renew and support instructor lecture machines in the same manner as student labs. This means:

- A number (20-30) computers have the same hardware and renewed at the same time
- The computers have the same software installed
- Computer Services work with the appropriate "owners" to determine what software needs to be installed
- Support tools such as "imaging" is used to install and support the software

For this to occur, some new processes and communication needs to be put in place.

In January 2008 the Instructional Technology (ITS) Department was merged with Computer Services. ITS has the responsibility of supporting audio/visual equipment in the classroom. With this merger, the goal is to develop a campus-standard lecture station and equipment so that there is consistency for the users.

Due to the lack of a single "owner" of many machines in a lecture classroom, the communication between Computer Services and the users have been poor. In Spring 2007 Computer Services began working with Student Learning to define a process and communication tool to address this gap. The plan was to use the tools of myCuesta to facilitate this communication. In addition the Technology Committee has taken on the task to work with Computer Services to achieve this goal.

TCO Requirements

	Category	Minimum Baseline	Cuesta Status
B1.a	PCs for Full-time Faculty	One PC, with appropriate assistive technology as needed, will be provided for every full-time faculty member.	Meets minimum standard
B1.b	PC for Adjunct Faculty	One PC, with appropriate assistive technology as needed, will be dedicated to part-time faculty for every part-time FTEF. PT FTEF = 153	Target = 153 Actual = 92 **Below minimum standard**
B2	Printers	One printer rated at 8 ppm or greater will be dedicated to every 25 faculty computers.	Either shared laser or individual inkjet printers are available to all computers. Exceeds minimum standard
B3	Office Software	100 percent of faculty computers will have access to word processing, spreadsheet, and presentation software.	Site license makes it available. It is installed on all campus office computers Meets minimum standard
B4.a	E-mail for Full-time Faculty	100 percent of full-time faculty will have access to campus e-mail via their computer. The E-mail system will enable off-site access.	Email is available to all employees. Remote access is available via myCuesta Meets minimum standard
B4.b	E-mail for Adjunct Faculty	Each district/college will provide adjunct faculty with a campus e-mail account upon request.	Email is available to all employees. Remote access is available via myCuesta Meets minimum standard
B5	Internet	100 percent of faculty computers will have access to the Internet via a browser.	All computers have Internet access Meets minimum standard
B6	Virus detection software	Each faculty computer connected to the Internet will be protected by anti-virus software.	Site license anti-virus software is purchased and installed Meets minimum standard
B7	Faculty Online Services	100 percent of faculty computers will have access to all faculty online services provided by the college.	All computers with Internet access have access to Cuesta web site. Meets minimum standard
B8	Refresh rate and currency of computers	PCs will be replaced on a three-year basis. This requirement is consistent with industry	63 < 2 year old 67 2 - 3 years old 39 3 – 4 years old

			17 4 - 5 years old
		practices.	21 5 - 6 years old
			60 > 6 years old
			Below minimum standard
B9	Online Library and Learning Resources	100 percent of faculty computers will have access to electronic library databases and the library card catalog.	All computers with Internet access have access to Cuesta web site, which includes library site. Library databases are available from off campus. Meets minimum standard
B10	Digital Media Services	Optical-character recognition and image scanning are available to faculty.	Campus standard scanner is available for purchase. Scanners also available in SLO and NC PDC. Meets minimum standard

Faculty Summary

Current software requires current hardware. In many instances the lack of current hardware hinders the tasks that faculty can complete. The issue of replacing desktop and lecture room computers in a timely manner needs to be addressed. In addition there is a need to have consistent multi-media stations in all lecture classrooms for faculty.

Cuesta plans on expanding their Distance Education offerings. The current support structure is lacking and needs to be addressed for this to happen. The new Director of Library/Learning Resources and Distance Education will need campus support and the necessary funding for this to happen.

Administration and Staff

Technology is critical to the running of the college. This technology not only includes the campus LAN infrastructure, individual PCs but also the campus administrative hardware and software. The administrative software system is vital to the running of the college on a daily basis.

Administrative Software – Project Oz

In February 2006 the Board unanimously approved to proceed with a multi-year project to replace the administrative software system (Project Oz). This project affects all the Cuesta community (employees and student) and require the active participation of many people and departments.

The product selected was Banner from Sungard Higher Education. The modules purchased include:
- Finance
- Institutional Advancement
- HR/Payroll
- Student
- Portal
- Workflow *
- Document Imaging *
- Room Scheduling *
- Degree Audit *
- Curriculum Management *
- Data Warehouse *
- Report Writer *

The add-on products (marked with an *) are large implementation projects themselves. As we begin implementing each one, business processes, staffing and on-going workload will need to be evaluated. In addition, there are many features in the core modules that departments want to implement that will also need to be prioritized.

Cuesta is using a consulting firm, Strata Information Group (SIG) to help with the implementation of the project. SIG is providing project management, functional and technical consultants. Each implementation team consists of SIG consultants, Sungard consultants, functional experts from each department, and Computer Services staff.

The implementation schedule is as follows:
- March, 2007 – myCuesta portal go live for employees – Completed!
- July 1, 2007 – Finance module go live – Completed!
- Fall 2007 – myCuesta portal go live for students – Completed!
- January 1, 2008 – HR/Payroll module go live – Completed!
- Spring 2008 – First piece of Financial Aid module go live – In progress

- June 2008 – Student module go live
- Fall 2008 – Final piece of Financial Aid module go live

Cuesta is in the final year of a three year project to initially implement the core modules. The college has gone through many unplanned changes during this time that are not a result of Project Oz, but affect the project. They include:

- Resignation of the President, appointment of Interim President, Hiring of new permanent President
- Resignation of two Vice Presidents, appointment of three Interim Vice Presidents
- Resignation, reassignment of three Deans, Hiring of one permanent Dean, having two Interim Deans
- Student Services moving to temporary offices in modular buildings, then moving into new re-configured permanent work space
- Computer Services staff moving to new permanent work space
- Instructional Services moving to new permanent work space
- Purchasing moving to new permanent work space

All these changes in addition to the change brought on by Project Oz have taking a huge toll on the employees involved. It speaks volumes to the character, work ethic and the desire of these employees to help this project succeed. Cuesta owes a huge debt of gratitude to all these employees.

Once this system is installed, students and employees will have access to many self-serve applications via their myCuesta portal. Self-serve applications include:
- Online Requisitions
- Management of Purchase Orders
- Manage Benefits and Deductions
- Payroll Information
- Submittal of Timecards
- Leave Balances
- Class Schedule
- Course Registration
- Student Accounts
- Grade Posting
- Financial Aid Information

Cuesta is taking this opportunity to analyze some of its business processes. It recognizes that some of the things that it does and how that they do them have evolved over time without necessarily any review. The team has identified some processes such as schedule/catalog development, purchasing to payment, prospective student to enrolled student to analyze looking for opportunities for improvement with the new software system.

Some critical success factors for this project are:
- Campus-wide priority project; from the top of the organization chart to the bottom, this must be a high priority project for the college.
- Implement the software within its parameters; do not make any modifications to the system. We have not met this goal, but have put in a process to minimize modifications.
- The appropriate staff members from each functional area must be re-assigned to the project. Assigning the staff member(s) with the necessary experience and knowledge is critical.
- Training, training, and training: not only must training be provided, but the necessary people must attend the training.

The departments that are heavily involved in this project are:
- Admissions and Records
- Benefits
- Computer Services
- Counseling
- Financial Aid
- Fiscal Services
- General Services
- Human Resources
- Institutional Advancement
- Research
- Student Learning

Other Software

Over the years, interfaces have been created between our legacy Student Records system and other vendor's systems. During the implementation of Project Oz, these systems will be evaluated and prioritized. Systems include:
- Interface to Assessment Test scores
- Interface to CCCApply
- Download of schedule data into InDesign
- Interface to Online Student Orientation
- Inteface to Faculty Flex Contract system
- Interface to custom Parking Permit system
- Download of student data to Blackboard
- Download to create faculty letters of agreement
- Interface to Student Photo-Id system
- Interface to Library system
- Non-Credit student lab login system so FTES can be collected
- Custom Early Alert system

TCO Requirements

	Category	Minimum Baseline	Cuesta Status
C1	PCs for permanent administrative and classified staff	One PC, with appropriate assistive technology as needed, will be provided for each of 80% of the permanent administrative and classified staff.	Meets minimum standard
C2	Printers	One printer rated at 17 ppm or greater will be dedicated to every 25 staff members.	Meets minimum standard
C3	Office Software	100 percent of staff computers will have access to word processing, spreadsheet, and presentation software.	Site license makes it available. It is installed on all campus office computers Meets minimum standard
C4	E-mail	100 percent of permanent staff will have access to campus e-mail. The E-mail system will enable off-site access.	Email is available to all employees. Web-based access is available. Meets minimum standard
C5	Internet	100 percent of staff computers in this category will have access to the Internet via a browser.	All computers have Internet access Meets minimum standard
C6	Virus detection software	Each staff computer that is connected to the Internet will be protected by anti-virus software.	Site license anti-virus software is purchased and installed Meets minimum standard
C7	Administrative Online Services	100 percent of staff computers will have access to job-related administrative online services provided by the college.	Yes Meets minimum standard
C8	Refresh rate and currency of computers	PCs will be replaced on a three-year basis. This requirement is consistent with industry practices.	154 < 2 year old 57 2 - 3 years old 62 3 - 4years old 8 4 - 5 years old 41 5 - 6 years old 43 > 6 years old **Below minimum standard**

Administration and Staff Summary

The implementation of new Administrative software (Project Oz) is a huge and critical undertaking by Cuesta. This new software will be used by Cuesta for the next 20 years. By early 2009 the initial implementation of the core modules will be completed. A project of this magnitude is never easy for any organization. It is critical that the individuals who

are responsible for the work feel that upper management fully supports their efforts. This project will test the teamwork, leadership, and ability to accept change campus-wide. Additional modules have been purchased whose implementation will need to be prioritized based on available staffing in the appropriate departments.

Infrastructure

The network infrastructure is the foundation of Cuesta's computing environment. It is critical to the running of the end-user applications even though it isn't visible to the users.

Cuesta College's computing infrastructure consists of:
- **Servers:** We have nearly 100 physical and virtual servers that provide applications or supporting facilities on the network.
- **Storage:** We have over 100 hard drives packaged in several arrays connected by a fiber optic network that store over six terabytes of data.
- **Network:** We have over 2500 wired network access ports in over 100 switches that provide basic network connectivity to almost 2000 connected devices. To maintain security and control, we have one firewall, 3 routers, and several other edge devices – shaper, gatekeeper, etc. The wireless network has over 75 wireless access points. All of this equipment runs 24 x 7 to provide continuous data communications capability.
- **Physical:** All of the systems described above occupy space in rooms across both campuses that must provide electrical power, thermal stability, and physical security.
- **Security:** Security is an essential attribute for all the above mentioned areas. Implementation of security affects all aspects of systems from operational processes to systems architecture.

All these components of the infrastructure are interconnected. They all must be working for the end user to be able to access the applications they use to perform their required tasks. The details of Cuesta's infrastructure can be found in Appendix C.

TCO Requirements

The TCO model has metrics to determine the ongoing budget for the purchase and maintenance of the college infrastructure. The details of metrics are in the Appendix A. The following is the summary.

The TCO model indicates an annual budget of $548,696 for infrastructure. The current annual budget for the campus LAN is $42,000 which means there are insufficient funds to replace equipment as it ages and becomes obsolete. The aged equipment stays in production beyond its useful life which results in high maintenance costs and sub-par performance for users. Much of the Cuesta College network equipment was purchased over 10 years ago. Many of the servers were purchased with one-time funds from the High Tech building in 2001. A majority of this equipment is end-of-life/end-of-support from the vendor.

	TCO Model	Actual Funding 06-07
PCs	$554,400	Unknown due to decentralized funding of PCs
OS and Office software	$184,800	Site license: $29,000
Peripherals	$184,800	Unknown due to decentralized funding of

		peripherals
Campus LAN	$604,300	$42,000
WEB	$92,400	$38,000
Technology Training	$138,600	$3,300

Despite the dismal equipment funding statistics listed above, the reality is that equipment funding is not the biggest concern for Cuesta College Computer Services. The biggest concern is the limited number of staff to maintain the large number of services and applications delivered by Computer Services.

Information Technology Growth

A substantial challenge to maintaining proper staffing in public sector Information Technology (IT) is the "hidden" tax relating to the growth of IT. Over the last several decades, and the last ten years in particular, the power of IT capabilities has increased dramatically. IT now pervades every facet of the institution's operations and delivers greater value to the users – in terms of speed, efficiency, and knowledge – than ever before. Users throughout the college can attest to the tremendous advantage modern computing and data communications systems bring to their daily work.

What is sometimes less clear is that the increase in the power of IT has a corresponding increase in cost. As information systems become more sophisticated, they also become more complex to maintain which sets higher standards for both quantity and quality of support staff. The private sector has typically responded to this set of facts by increasing investment in technical staffing as a means to develop a competitive edge. As a rule, public sector administrative organizations are comparatively slow to adapt to such changes.

Two years ago Cuesta College committed a six million dollar investment to replace the mainframe-based administrative software system with a modern, multi-tiered, multi-server enterprise resource planning system – Banner. As Banner has come on-line, employees and students are discovering a rich set of new tools for getting their work done. And as we implement additional components and become more familiar with the available functionality the college will continue to derive value from new services and increased efficiencies for many years to come. However, the college has not yet increased Computer Services staffing to match the substantial investment in Banner. The old system ran on one server. The new system requires over a dozen. The old software was relatively self-contained; the new software is highly distributed.

The shortfall of Computer Services staffing is approaching critical mass. The staffing impact of Banner comes on top of years of under funded IT expansion relating to new services and new buildings. The physical growth of the college has mandated the expansion of the LAN and significantly increased the number of personal computers. At the same time, new services such as wireless networking, remote access VPN, and

instructional lab server environments were provided in response to user demand. These services were not compensated for with additional staffing.

As a result, Computer Services has been forced to defer maintenance for existing systems as well as the implementation of new network management systems that would improve monitoring and allow for proactive intervention to prevent predictable failures. Moreover, Cuesta College has not maintained support for the physical environment in which the ever increasing numbers of systems are installed. Below is a list of the critical unmet needs:

- Provide generator backed power. Power outages cause a minimum of 9 – 24 hours of down time. In addition, the sudden loss of power and "crashing" of servers causes hardware and operating system deterioration.
- Replace obsolete and aged network equipment. Many users are connected to the network at $1/100^{th}$ of the current industry standard network speeds. Over half of our network switches are no longer supported by the manufacturer.
- Replacing obsolete and aged servers. With our current inventory of approximately 50 physical servers, we should be replacing approximately 10 every year. We typically can afford to replace two to four.
- Implement security and performance monitoring for the network. Our network staff have almost zero visibility to pending network problems including performance issues and viruses.
- Improve fault monitoring for storage and servers. Hard drives and power supplies fail on a regular basis. Our current monitoring does not provide advanced notification or reliable real-time notification on failed systems.
- Implement environmental monitoring of server rooms. Fluctuations in temperature can cause damage to expensive equipment.

Infrastructure Summary

Computer Services must provide a modern, productive, and secure computing environment for the students, faculty, staff, and associates of Cuesta College. However, the quality of that environment and the value that it brings to its customers will be guaranteed over the long run only if the underlying infrastructure is well maintained. Over the last several years, Computer Services has maintained a very good record for reliability of service. However, because of a significant shortage of staffing, many projects that would strengthen the underlying infrastructure have been deferred.

Support

Having the necessary number of technical support for the campus community continues to be a big issue facing Cuesta. The Networking staff has a backlog of over 50 projects. Many of these are critical to the security and performance of our campus LAN. In addition, Project Oz has added significant work that is time critical. There is not enough time to do many necessary proactive projects because all their time is spent either working on projects dictated by others (new buildings, remodels, Project Oz), maintaining the current installation, or reacting to unexpected events (i.e. hardware failure, power outage, vendor software issue).

The PC Technicians (Level 1 Support) consistently have 50-70 open workorders. This backlog is more visible to the campus customers on a day-to-day basis. The Accreditation report from the 2002 visit listed 3 recommendations, one of which was the issue of adequate staffing for new programs and facilities. This has yet to be significantly addressed by Cuesta.

When Cuesta started the implementation of the Banner software for Project Oz, it was unclear what the staffing needs would be in the programming area. There was a question as to how much was needed on-going versus during implementation. In addition to the core modules, Cuesta purchased many add-on modules such as Data Warehouse, Degree Audit, Room Scheduling, and workflow. It is now apparent that additional programming staff is necessary to support these new systems. Most colleges have 1 programmer assigned to each major module (4). The additional systems purchased will also require additional dedicated support resources.

In January 2008 the Instructional Technology Services (ITS) department which reported to the Director of Library/Learning Resources was moved to Computer Services under the Supervisor of Network and PC Support. This new organization will give the users a single point of contact and a single process to get help with both A/V and Computer equipment. This will be a big benefit to the users.

In addition, to the work within Cuesta, technology continues to change in the market place and Cuesta must react to these changes. These changes range from new security threats, new versions of vendor software, critical updates on existing software, and new hardware. The customers have high expectations on Computer Services ability to implement and support new technology in a timely manner. Unfortunately the department cannot always meet these expectations.

Cuesta continues to get funding for new and remodeled buildings. The State funding model funds the equipment, but not the staff required to install or support the equipment ongoing. Cuesta needs to find a way to address this critical problem.

The lack of permanent PC support staff is augmented with hourly employees. Each year a large portion of the funds needed come from one-time sources (i.e TTIP, CTE/VATEA, or Foundation). Each year it is questionable whether enough funds will be found to continue

with the current hourly staffing levels. Without this addition one-time money, the staffing will decrease and adversely affect Computer Services ability to support the current campus users.

New Projects affecting Support

Project	Timeframe	Computer Services Responsibility
Project Oz	2006 – on going	• Project Oz requires a numerous interdependent servers to run the various applications • Once initial implementation is completed, on going hardware and software renewals will be required • New mission critical applications running on new technology that Computer Staff must learn • Cuesta purchased additional applications that enhance the functionality of the cores systems. • This is a huge departure from our previous single system running all Administrative software systems
SLO Theater Arts Building	2007–2009	• New wiring/infrastructure • Faculty offices • Box Office
NC Trades and Technology Building	2008-2010	• 4 Student computer labs • Faculty Offices
NC Learning Resource Center	2080-2010	• Numerous classrooms • 2 Student computer labs • Student open computer lab • Distance Learning Classroom • Permanent IT center for campus • DSPS area • Faculty offices • ELIC facility

Support of South County Centers

There are currently administrative office computers at AGHS and at NHS used by Student Services staff. Citrix technology is currently used to allow access to appropriate applications and data that reside on the campus LAN.

Cuesta uses student computer labs at the site. Cuesta staff works with LMUSD staff if additional software is required to support our classes.

This past year Computer Services started providing on-site support at the South County Centers with PC Support staff 2 evenings per week. By having this technical staff on site has helped with Cuesta's working relationship with the LMUSD staff.

Cuesta currently has no plans for expansion of services or classes at the current LMUSD sites. If a new site dedicated to Cuesta is found and implemented, the necessary initial and on-going support staff will need to be evaluated.

TCO Requirements

	Position	*Description*	*Basis*	*Minimum*	*Cuesta*
S1	Computer Technician	Installs, configures, repairs, & maintains computer hardware and software including servers and assistive technologies. Maintains network connectivity and provides customer support.	1 / 125 computers (for all college / district computers)	1	1848 computers 1848/125 = 14.7 Techs Actual = 4 PC Techs **Below minimum standard**
S2	Computer lab/classroom technical assistant	Provides simple technology maintenance and assists faculty & students during and out of class with technology issues.	1 / 75 computers (for all computers in labs and classrooms)	1	1153 computers 1153/75 = 15.3 Actual = 8 **Below minimum standard**
S3	Network Engineer / Technician	Designs, installs, configures, repairs, & maintains campus backbone(s), networks, and WANs	1 / 500 computers (for all college / district computers)	1	1848 computers 1848/500=3.7 Actual = 3 Net Techs; 1 Net Admin Meets minimum standard
S4	Webmaster / Web Administrator / Web Designer	Designs and maintains the district's / college's Web infrastructure and Web site	1 / 4,000 FTES	1	FY 06-07: 9225 FTES 9225/4000 = 2.3 Actual = 1 Webmaster **Below minimum standard**

	Position	*Description*	*Basis*	*Minimum*	*Cuesta*
S5	Instructional Designer / Technology Specialist	Assists faculty with integrating technology into curriculum	1 / 100 FTE faculty (PT & FT)	1	Fall 2007=348 348/100= 3.5 Actual = 1; same employee listed under Technical Training Specialist **Below minimum standard**
S6	Multi-media technician	Installs, configures, repairs, & maintains multi-media equipment (satellite downlink, broadcast equip., microwave, head-end delivery, etc.)	1 / 300 FTE faculty (PT & FT)	.5	Fall 2007 = 348 348/300 =1 Actual = 1 Meets minimum standard
S7	Multi-media production specialist	Supports faculty with multi-media production, delivery, and operations.	1 / 200 FTE faculty (PT & FT)	.5	Fall 2007=348 348/200 = 1.7 Actual = 0 **Below minimum standard**
S8	Technical Training Specialist	Trains staff and faculty. Runs a technology training center.	1 / 300 FTE faculty & staff (PT & FT)	1	348 FTEF Faculty 205 FTE Classified 31 FTE Mgr/Admin 400 Hourly (assume .25FTE) 684/300 = 2.28 Actual = 1 **Below minimum standard**

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	Position	Description	Basis	Minimum	Cuesta
S9	Instructional Application Developer / Administrator	Designs, installs, configures, repairs, & maintains software applications to support instruction (e.g. systems analyst, programmer, systems administrator roles) to include support for email, library systems, course management software, listserves, and newsfeeds.	1 / 200 FTE faculty (PT & FT)	1	348 FTEF Faculty 348/200 = 1.74 Actual = 4; same employees listed under Network Engineer / Technician **Below minimum standard**
S10	Communications Technician	Installs, configures, repairs, & maintains communication systems and wiring	1 / 1,000 FTE staff and faculty (FT & PT)	1	348 FTEF Faculty 205 FTE Classified 31 FTE Mgr/Admin 400 Hourly (assume .25FTE) 684/1000 = .6 Minimum = 1 Actual = 4; same employees listed under Network Engineer / Technician **Below minimum standard**

	Position	Description	Basis	Minimum	Cuesta
S11	Helpdesk Technician	Provides a central point of contact to receive reports of technical problems from students, faculty, and staff. Documents all requests and notifies appropriate service area. Provides technical answers to questions.	1 / 5,000 FTES	1	FY 07-08: 9225 FTES 9225/5000 = 1.8 Actual = 1 **Below minimum standard**
S12	Technical Manager	Manages technical personnel & sub-functions	1 /10 technical staff	0	Staffing should be 23.8 23.8 / 10 = 2.3 Tech Mgr Actual 9 FTE + 4 hourly employees 1 Tech Mgr Meets minimum standard
S13	Director or higher level manager who supports instructional systems	Manages overall instructional technology function. Acts as liaison with academic administration.	1	1	Actual = 1 Meets minimum standard

Recommended FTE Computer Support Staff: 30
Actual FTE Computer Support Staff: 12

Support Summary

Project Oz is not only adding to the short term projects, it is adding to the on-going workload of support staff. The system relies on numerous applications running on numerous servers with many interdependencies. It is critical to the success of Project Oz that this infrastructure has high reliability and performance.

For many years the lack of appropriate number of Computer Support staff has been an important issue. With the implementation of Project Oz and other new project it is now critical. Computer Services has received amazing support from other departments on campus with this issue. These shortcoming must be addressed. If not, Computer Support at Cuesta will continue to deteriorate and affect the ability of the college to fulfill its mission.

Training / ELIC / PDC

Background

Technology training has been a part of Cuesta since 2000.
- In 1994 the first Technology Trainer was hired at Cuesta College
- In Fall 2000 the SLO campus opened the Employee Learning and Innovation Center (ELIC).
- In Spring 2002 some space at the North County campus was re-allocated in order to create an ELIC.
- 2000-2004 Cuesta had 2 FTE Technology Trainers
- June 2004 – present; Cuesta has 1 Technology Trainer
- January 2008 the Professional Development Center (PDC) on San Luis Obispo campus opened

In January 2008 the ELIC at the San Luis Obispo campus was moved and renamed the Professional Development Center (PDC).   The center has two computer classrooms available along with computers and equipment (scanners, printers, etc) in the open area of the PDC for special projects or one-on-one sessions. The PDC encompasses all professional development, not just technology. It is clear however, that technology training is a part of professional development for all Cuesta employees.

In addition, a new position, Director of Professional Development was hired at Cuesta in January 2008. This new position along with the Director of Computer Services and the Technology Trainer are working together to evolve and grow the services in the new PDC that were provided in ELIC.

Current Status

Training is available in numerous ways
- Regularly scheduled classes throughout the semester (including Flex activities)
- Some departments schedule training on a regular basis (per department head request)
- One-on-one training for special projects
- CBT (computer based training) is available for some campus standard applications
- Ad hoc (remote desktop) training via LANDesk

The ELIC/PDC training rooms have been critical to the implementation of Project Oz. The classrooms have been used for Banner and Luminis/myCuesta training 3-5 days per week. In addition, this facility is used for potential vendors to demonstrate their products to employees.

On-going training is not only available via the classroom, in addition there is a "Tip of the Week" which appears in "T3 – Tech Tips and Training", a channel available in myCuesta. Archives of "Answers from ELIC" have been posted on the ELIC website, available also from the "T3 – Tech Tips and Training" channel.

Training/ELIC Statistics (SLO and NC)

- Class attendance
    - Fall 2004 = 286
    - Spring 2004 = 294
    - Summer/Fall 2005 = 352
    - Spring 2006 = 210
    - Summer/Fall 2006 = 278
    - Summer/Fall 2007 = 113 *
- Individual logged ELIC use:
    - July-December 2004 = 243
    - January-December 2005 = 606
    - January-December 2006 = 405
    - January-December 2007 = 162*

    * usage was affected by Project Oz and re-allocation of space in ELIC during Library Expansion remodel

Project Oz

Training staff has been greatly impacted by Project Oz. Before the new PDC space was available, the single ELIC training room had to be shared between the Technology Trainer and Project Oz. Unfortunately Project Oz required many dedicated days of training during the past two years. Since January and the PDC opening, there is now a training room dedicated to Project Oz needs and one dedicated to the Technology Trainer.

In addition, the Technology Trainer has added Project Oz training to his plate. He not only provides group trainings, but has also the developing of CBT (computer-based training) modules. On going training will be needed as new employees come to Cuesta. In order to address this, the goal is to have CBT modules available for all widely-used functions.

Future Plans

- Video-editing stations have been added to PDC. This will allow employees to create their own podcasts, movies and sound files.
- Quick reference material is being developed for every PDC station, allowing users to look up step-by-step solutions for common tasks.
- An on-line process for checking availability and requesting training room reservations will be created and deployed.

Issues

- On-going funding to keep PDC technology current. The Library Expansion / Student Services remodel project provided new computers in the SLO PDC. This is great, however in a few years, this technology will again, be outdated and in

need of renewal. For this facility to be useful to employees, the technology available must be kept current.

- Employee technology training needs are increasing. Project Oz will add addition responsibilities to this area.
- There is a dire need for technology training in Distance Ed tools. We currently don't have the resources to do this.

Training/ELIC Summary

Technology Training and the ELIC/PDC facilities are highly utilized by Cuesta employees. This shows that they are eager to improve their technology competency and utilize new technology in the classroom. The coming year Computer Services will be working with the Director of Professional Development to institutionalize the PDC and its offering for employees.

Web Site

Cuesta's web site has begun to evolve due to changes brought by Project Oz. Project Oz provided a personalized portal (myCuesta) for all students and employees. Due to this new system, the content of the public web site (www.cuesta.edu) will change.

The challenge in 2008 is to clearly communicate to the students where in the web site they must go to access their information and perform such tasks as register for classes. For Spring and Summer 2008 students will use our legacy system, PAWS for all these functions. For Fall 2008 they will use the new system that is accessed via myCuesta. During this transition the web site must clearly steer the students to the correct systems.

After the transition from PAWS to myCuesta is complete, the content of the public web site will be evaluated and evolve to focus on a more marketing function, for our potential students, their parents and the community.

In addition to the content of the public web site changing, the look and feel of the site will change. Again this change will be over a period of time. The timeline for this change is:
- March 2007 – myCuesta available to employees – Completed!
- Summer 2007 – Update look of www.cuesta.edu and incorporate myCuesta access - Completed
- Fall 2007 – myCuesta available to students (includes student email) - Completed
- Summer – Fall 2008 – begin redesign and evolve content of www.cuesta.edu

Public Web Site

The look of the public web site (www.cuesta.edu) was last overhauled in 2002. Given this and the introduction of myCuesta it is appropriate to update the site. The number of pages that are controlled by the WEB committee is limited to the home page and 2 layers underneath. Contributors to the web site have some leeway on the look of their pages. However, there are some criteria that must be met.

Prior to the introduction of myCuesta, most all the information was available to anyone who had an Internet connection. MyCuesta provides a place for information that has no relevance to the public at large. Over time, this information will move into myCuesta. The public web site will contain only information that is relevant to the general public, prospective students, their parents, or the community.

Cuesta's web site continues to be a highly used asset, both by our students, and the public. A team, (Director of Marketing and Communication, Director of Computer Services, Director of Learning Resources, Executive Director of Human Resources, and Director of Admissions and Records), manages policies, procedures and processes for the website.

Department, Program and individual's pages are the responsibility of departments and individual. It has always been an issue in keeping the content of these pages updated with current information. The Webmaster reviews the pages and lets the owner know if the

content has not been updated recently, however the ultimate responsibility lies with the individual or department. As we review the public web site during this evolution process Cuesta will need to take a strategic view of the site and determine the appropriate tools and staffing that will be necessary to have it meet the needs of the college and our target audience.

myCuesta

As part of Project Oz, myCuesta portal was implemented. It provides secure access to personalized information for employees and students. In March 2007 it was made available to employees. In November 2007 it was made available to students.

A cross section of Cuesta employees created the team that implemented myCuesta. The team that manages the policies and procedures of the public web site is responsible for those of myCuesta. A team of "content providers" not only created the channels for the system, but also worked on the appropriate policies. This team consists of individuals from Counseling, Admissions and Records, Student Learning, Human Resources, Athletics, Financial Aid, Computer Services, Marketing and Communications, Library, DSPS, Institutional Advancement (and much more…).

myCuesta provides:
- Secure access
- Ability to personalize information
- Numerous communication tools
  - Announcements
  - Groups
  - Courses
- Access to personal information
  - Employee Benefits
  - Pay Information
  - Class Schedule
  - Registration
  - Grades
  - Fee Payment
  - And much more…

Communication Tools
myCuesta provides numerous tools that can improve communication between its community members

College-wide Announcements	• Easily communicate important information to all employees and students

Groups	• Communication tools such as:
	    o Message Board
	    o Email
	    o Announcements
	    o Chat

	- News - And much more… - Any employee can request a group that supports the mission or business of Cuesta
Personal Announcements	- Can be posted based on role (employee, faculty, student) - Can be posted based on Group membership - Can be posted based on class enrollment
Channels	Information provided by a department that users can subscribe to
Course Studio	- Automatically created for each course section - Students are automatically added/removed based on enrollment - Same communication tools as Groups (see above) - Cuesta email provided to all students to enhance communication.

Future Projects

- Update look of public web site (www.cuesta.edu) – Fall 2008
- Virtual Campus Tour - 2008
- Student collaboration tools for classroom – Fall 2008
- Evolve the content of public web site - 2008
- Continue to add content to myCuesta – ongoing
- Provide myCuesta for potential students - TBD

Web Site Summary

Cuesta's web site is a successful project combining cooperation and innovation from the campus community that provides an important service to our customers. As we evolve the site with myCuesta, it is important to keep our target customers – FTES generating and potential FTES generating students – in mind as decisions are made. It is important that the information on the web site is kept up to date. During this evolution process appropriate tools and staffing to keep the web site current will need to be considered.

The success of myCuesta lies with the content available and how it is used by the community. It will take some time for these tools to become part of the daily life of the users. Providing compelling and timely content is one of the success factors. As the other pieces of Project Oz become available, additional information and functionality will be available in myCuesta.

Technology Committee

The Technology Committee has representation from all campus groups and meets monthly during the school year.

The goals of the committee this year were:
- Be knowledgeable about Project Oz
- Work to improve the communication and process between Computer Services and Instructors as it pertains to the classroom multi-media lecture stations
- Determine the next steps of the Curriculum Software Management project
- Support staffing for technology support after business hours
- Support staffing needed to help students with myCuesta and wireless

In addition the Technology committee is the approving body for:
- Increase in server space allocations (email, P and G)
- Computer equipment migration to/from student labs.

Examples of sharing information about technology at Cuesta:
- Project Oz
- Student wireless and myCuesta
- Workload required after a power outage and the need for backup generator in the new server room
- Plan to improve communication between Instruction and Computer Services re: support of multi-media lecture stations
- Update of employee and student computer use policies
- Accreditation sub-standard 3C; Technology Resources

Conclusion

Many of the number comparisons are based on the TCO Model outlined in the Technology II Plan from the Chancellor's office. This plan and model were developed with the expectations that the State would use it to fund technology at the Community Colleges. The downward spiral of funding for this project began with the energy crisis of a few years ago, now the State's budget crisis has continued this spiral and the funding has not come to fruition. However, the need for TCO-based funding still exists and is a critical issue for the college.

The general feeling on campus as regards the amount of technology available to students and employees is that Cuesta is in a relatively good position. The key is to keep what is already in place up-to-date.

Since 2001, the inception of writing an annual Technology Plan based on the TCO model, the two most critical areas have not changed. They are:
- Renewing the already deployed technology – computers and infrastrucutre – on a regular basis.
- Having an appropriate number of computer support staff.

Since the inception of writing an annual Technology Plan the following continue to happen:
- Cuesta continues add new building
- Cuesta continues to add student labs
- Technology continues to change at a rapid pace
- Students and employees continue to have high expectations of current and new technology available at Cuesta
- Cuesta continues to work without a funding plan for keeping Cuesta technology renewed
- Cuesta replaced its legacy administrative systems with current technology and much more functionality

While Computer Services supports the expansion of facilities and technology at Cuesta College, it must also point out that a continued imbalance between the existing commitments (the support of every new lab and building that comes online) versus the limited resources (the inability to maintain TCO-correct budgets) will lead to degraded support. In the worst case, the infrastructure itself becomes degraded and critical failures causing widespread outages occur. This imbalance can be addressed by either increasing equipment and staff budgets or by reducing the amount of equipment and infrastructure that needs to be supported.

Computer Support Staff and Timely Renewals of Computers
These two to topics inter-relate:
- Cuesta's computer support staff is 12 and the TCO metrics indicate that it should be 30.
- Cuesta provides over 200% of the TCO recommended computers for student use

- Almost half of the computers in student labs are over 5 years old and need to be replaced.
- Some of the network components are no longer supported by the vendor, others are nearing end-of-life
- More new building and student labs are planned, which will further worsen the situation; both from the support point of view and the need to fund renewals in the future.

It is time for Cuesta to take a strategic look at the support of technology at Cuesta, what technology is provided and the funding required. Computer Services would be pleased to participate in such a discussion.

Now that wireless is available to students, the numbers and locations of open lab computers needs to be evaluated.

Project Oz

Cuesta has embarked on a project that will prepare us for the next generation of students and employees. This project will affect all areas of the campus, encompassing students, employees and community members. It has a significant impact on how Cuesta does business; information gathering and processing, analysis, and decision making. It is critical to the success of this project that the necessary resources give it their highest priority.

It is now evident that additional programming staff is required to maintain this new system, hardware and software. Cuesta also purchased add-on products that will need to be prioritized and implemented as staffing is added.

Polycom

Multi-channel video conferencing technology has great potential for use in many areas at Cuesta. We are in the early stages of using this to provide instruction at both SLO and NC campuses simultaneously. Many meetings current depend on this technology to include all committee members. It is time for a broad long term look at this technology and how it will fit at Cuesta. Items that need to be addressed:
- Usage: Instructional, Administrative, Student Support
- Funding; initial and ongoing
- Installation/room scheduling
- Return on investment
- Support; initial and ongoing

Appendix A – Total Cost of Ownership (TCO) Status

List of all the TCO elements:
- TCO# - unique identifier used in Technology II documentation
- Category – Brief Description. Detailed information can be found in the Technology II documentation
- Below/Meets/Exceeds Baseline: indicates Cuesta's relationship the TCO minimum baseline.

Student PC Baseline Standards

TCO#	Category	COMPARISON TO MINIMUM STANDARD
A1.a	PCs for student	Exceed
A1.b	PCs for student with assistive technology	Meet
A2	Printers	Meet
A3	Office Software	Exceed
A4	E-mail	No standard defined
A5	Internet	Exceed
A6	Virus detection software	Meets
A7	Student Online Services	Exceed
A8	Refresh rate and currency of computers	**Below**
A9	Online Library and Learning Resources	Exceed

Faculty PC Baseline Standards

TCO#	Category	Comparison to Minimum Standard
B1.a	PCs for Full-time Faculty	Meet
B1.b	PCs for Adjunct Faculty	**Below**
B2	Printers	Exceed
B3	Office Software	Meet
B4.a	E-mail for Full-time Faculty	Meet
B4.b	E-mail for Adjunct Faculty	Meet
B5	Internet	Meet
B6	Virus detection software	Meet

TCO#	Category	Comparison to Minimum Standard
B7	Faculty Online Services	Meet
B8	Refresh rate and currency of computers	**Below**
B9	Online Library and Learning Resources	Meet
B10	Digital Media Services	Meet

Administrative and Classified Staff PC Baseline Standards

TCO#	Category	Comparison to minimum standard
C1	PCs for permanent administrative and classified staff	Meet
C2	Printers	Meet
C3	Office Software	Meet
C4	E-mail	Meet
C5	Internet	Meet
C6	Virus detection software	Meet
C7	Administrative Online Services	Meet
C8	Refresh rate and currency of computers	**Below**

Support Baseline Standards

Based on a requirement to provide support only Mondays through Fridays, eight hours a day (5x8). This is insufficient to support most colleges' requirements for IT support.

TCO#	Position	Comparison to minimum standard
S1	Computer Technician	**Below**
S2	Computer lab/classroom technical assistant	**Below**
S3	Network Engineer / Technician	Meet
S4	Webmaster / Web Administrator / Web Designer	**Below**
S5	Instructional Designer / Technology Specialist	**Below**
S6	Multi-media technician	Meet
S7	Multi-media production specialist	**Below**
S8	Technical Training Specialist	**Below**

TCO#	Position	Comparison to minimum standard
S9	Instructional Application Developer / Administrator	**Below**
S10	Communications Technician	**Below**
S11	Helpdesk Technician	**Below**
S12	Technical Manager	**Below**
S13	Director or higher level manager who supports instructional systems	Meet

Staffing Summary

TCO Model Staffing – need to update	Actual Cuesta Staffing (as of March 2008)
14.7 FTE PC Technicians 3.7 FTE Network Engineers/Technician 2.3 FTE Webmaster/Web Administrator 1.74 FTE Instructional Application Admin 1.0 FTE Communications Technician 1.0 Multi-media Technician ---------------------- 22.4 FTE	4.0 FTE PC Technicians 4.0 FTE Network Technicians 1.0 FTE Webmaster 0 FTE Instructional Application Admin 0 FTE Communications Technician 1.0 Multi-media Technician ------------------------ 10.0 FTE
2.8 FTE Instructional Designer 2.8 FTE Technical Training Specialist 1.8 FTE Helpdesk Technician -------------------- 7.4 FTE	0 FTE Instructional Designer 1 FTE Technical Training Specialist 1 FTE Helpdesk Technician ------------------- 2 FTE
Total: 29.9	**Total: 12.0**

Infrastructure Model versus Current Budget

Category	Minimum Baseline Standard (Cost/Year/PC) [Cuesta TCO Amount]	Current Budget and/or Cost
PC hardware and Operating systems	$300/yr/PC [$554,400]	Cost: $1000/PC (Acquisition depreciated over 3 yrs)
Assistive technology hardware and software(10% of PCs)	$667/yr/PC [$21,983]	Cost: $150 natural keyboard, and trackball (Acquisition depreciated over 3 yrs)
O/S and Office Software Licenses	$100/yr/PC [$184,800]	Microsoft Site License: Cost: $29,000/year
Peripherals	$100/yr/PC [$184,800]	Cost: $1100/ group laser printer $150/personal ink printer
Network Operating System Hardware	$45/yr/PC [$83,160]	Budget: $42,000
NOS Licenses	$20/yr/PC [$36,960]	Cost $250/server to purchase license
Switches, hubs and bridges (Hardware and Software)	$42/yr/PC [$77,616]	Included in $42,000 budget listed above
Wiring	$60/yr/PC [$110,880]	Included in $42,000 budget listed above
NSM Hardware and Software	$160/yr/PC [$295,680]	Included in $42,000 budget listed above
Servers (HDW and SFTW) for web services)	$50/yr/PC [$92,400]	Budget $38,000
Training	$250/yr/PC [$462,000]	Not sure how this differs from next item.
Technical staff training	$75/yr/PC [$138,600]	Budget: Department Budget: $3,300

Appendix B – Migration Framework

Approved by Technology Committee 1/27/2006

Goal

It is recognized that computers need to be replaced on a regular basis. The goal is to have a dependable funding source to refresh computer lab hardware 3-5 years (ongoing). The need for new hardware is usually driven by the needs of software, peripherals or required resources (i.e. file size).

Given the number of labs currently at Cuesta, 8-12 labs would need to be renewed each year. Computer Services staffing levels are a limiting factor in this goal. In addition, having non-scheduled time in classrooms may affect the number of labs that can be worked on.

Parameters

This framework was developed to address the computer refresh needs of computers located in:

- ❑ Existing instructional labs (and associated faculty offices)
- ❑ Student use in Libraries
- ❑ Lecture machines
- ❑ ELIC (SLO and NC)

Refreshing computers include, but are not limited to complete replacement of systems or components (i.e RAM or Hard Drive). The value of migrating replaced computers to another lab will be evaluated on a case by case basis.

Computer Acquisition

Lease versus Purchase

Leasing computers that reside in all Open Labs will be evaluated. All other computers will be purchased. This framework only applies to computers that are purchased by Cuesta.

The current process of purchasing computer hardware at Cuesta applies to this process. Computer Services works with appropriate faculty on specifications for the hardware from the current campus standard vendor.

Assumption

Each fiscal year a set dollar amount will be identified for this process. The amount may vary from year to year, but will be $100,000 at a minimum.

Process

- ❑ Each Spring, Director of Computer Services updates the Technology Plan
  - o Meet with each Division Chair, Director and Administrator
  - o Identify issues with current labs or potential issues given anticipated changes (i.e. software upgrades).
- ❑ A new section in the Technology Plan after the *Computer Lab: Current Status* section
  - o Technology Committee lists a subset of labs that are in need of upgrading (the "short list").
  - o "In need of upgrading" could be complete system replacement or component upgrade (RAM, Hard drive)

- ❑ The Technology Plan is distributed on campus and is available via the Technology Committee's web site

- ❑ Each Fall
  - o The funding for the fiscal year is known
  - o The departments with labs on the short list will be invited to submit written proposals and/or present to the Technology Committee for consideration.
  - o The Technology Committee will match the priorities with the available funding and create the list of labs/computers that will be funded that fiscal year
  - o Migration of existing computers to other labs will be evaluated on a case by case basis
  - o Divisions may have to do some "creative scheduling" in order to provide the necessary non-scheduled block of time necessary for the work to take place.

Notes:
  - o This process is for existing labs only. New labs must be initially funded through another process

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Appendix C - Infrastructure Detail

Discussed below are the major areas of computing and communications infrastructure currently supported by Computer Services. These groupings represent collections of responsibilities – "work centers" – maintained by Computer Services to meet end-user computing needs.

Much of the work Computer Services performs is at the infrastructure level which is not visible to the end-user. However, the services and applications that are visible to the end-user could not exist without the reliable operation of the underlying infrastructure. Ultimately, all of the services delivered by Computer Services are dependent on infrastructure described below.

Technology

Facilities

Assets included in this group are the server rooms, racks, the power conditioning equipment, the copper and fiber optic cables, and the passive interconnects that comprise the computer network on each campus. Much of the work effort in this group is associated with maintaining a stable and correct mechanical, thermal, and electrical environment for equipment and cabling. For example, the power used by electronic equipment must be conditioned, and in most cases, backed up by battery-powered uninterruptible power supplies (UPS).

Previously, the administration has considered but deferred plans to provide generator-backed power. However, this facility is now being reconsidered due to the increased complexity and uptime requirements associated with Banner and the myCuesta portal. Currently, all of the critical and sensitive infrastructure described below continues to be exposed to random power outage events which are unfortunately common on the SLO campus.

Work tasks in this area include:

- Cable Plant: design and physical deployment to extend or reconfigure the physical network to accommodate new buildings, remodels, office moves, etc.
- Electrical Power: replacing batteries, installing or reconfiguring uninterruptible power supplies (UPS) for changes in load, etc.
- Server Rooms and Network Closets: installing or reconfiguring racks and consoles which house the computing and networking equipment.

Network

The Network may be considered the key facility that enables virtually all other computing services at Cuesta College. This is true not only because personal computers are as much communication devices as they are computing machines, but also because much of the desktop computing environment at Cuesta College is delivered over the network: login authentication, P and G drives, printing, etc.

The Network is a dynamic and challenging entity to manage due to the broad range of technologies and equipment that deliver the service. Additionally, it is an area where many security efforts are focused. The proliferation of network-born viruses has substantially increased the work effort expended to maintain a stable network.

Specific tasks in this area include:

- LAN Administration: installation of new switches/routers, adjusting configuration of existing switches/routers to accommodate changes in physical topology, additional services, firmware updates, etc.
- WAN Administration: procure and monitor data circuit products from carriers, interface with carrier hardware, configure and manage routes.
- Access Control (Firewall): install and maintain perimeter and internal security apparatus, periodic evaluation of allowed, disallowed, and metered protocols traversing the college network, configuration of external and internal devices to control these protocols.
- Wireless: deployment and configuration of wireless access points, definition and deployment of security policies.

Storage

The Storage Area Network (SAN) infrastructure is critical because is provides the repository for the vast majority of system and user data for the servers at Cuesta College. Computer Services presents over six terabytes (six trillion bytes) of online data for the college community. To maintain the high reliability and performance necessary for our server environment requires 24x7 operation of over 100 disks which hold over ten terabytes of raw storage.

To develop an infrastructure that can store this volume of data with multiple layers of redundancy and high performance capability has required substantial investment in equipment and staff resources. Next to the data communications network, storage is the most costly facility to maintain. As the demand for larger, faster and more reliable storage continues, high costs are expected to continue.

Work efforts in this area include:

- Fiber Optic Network: installation of fiber optic cabling, installation and configuration of fiber channel host bus adaptors and switches, fabric zoning.
- Storage Devices: placement and configuration of storage cabinets and tape libraries, disk allocation, disk replacement, mirror configuration.
- Backups: scheduling and monitoring of hourly, daily and weekly backups; tape formatting, rotation, archiving, and retrieval; maintenance of tape drives including cleaning, monitoring of library robot arms.

Servers

Over the last two years, Computer Services has transitioned to server virtualization, a technology that allows multiple "virtual servers" (VMs) to reside on a single physical server. The primary benefit is a reduction in server hardware which means a reduction in space, power and generated heat load. The virtualization technology also enhances resiliency to hardware failure and increases the specialization and therefore security of server images. All of these are positive outcomes and the trend towards server virtualization is expected to continue.

However, like all new technologies added to the data center, server virtualization creates an additional administrative responsibility which increases total workload for staff. While some work savings accrue due to a reduction in the number of physical servers, this relatively simple manual work is replaced by sophisticated administrative control of the primary virtualization platform, VMWare ESX. Therefore, the move to virtualization should be viewed as providing improved uptime and security as well as a reduction in cost for equipment, space, power and cooling. So far, it has not resulted in a work savings.

Despite the increase in virtualization, Computer Services also continues to deploy new physical servers. Two years ago we deployed four new IBM P5-Series servers to support the Banner and Oracle components of Project Oz. (These servers employ IBM's proprietary server virtualization technology called "logical partitioning" or LPAR.) We also deployed a high-end Intel architecture system to support myCuesta portion of Project Oz. More recently we have deployed new servers for mail gateways, file and print sharing, and third VMWare ESX node. This summer we expect to replace up to ten more servers in order to retire systems that were purchased in 2001 and are no longer supported.

Physical Server Details

Server Name	Redundancy	Purpose	Technology Level	Status/Plans
AIX Dev/Test	LPAR Migration	Development and Test Environments	8-way Power5 Series 1.65 GHz	New
AIX PROD App	LPAR Migration	Production Application Server	8-way Power5 Series 1.65 GHz	New
AIX PROD DB	LPAR Migration	Production Database Server	4-way Power5 Series 1.65 GHz	New
Anchovy	Active/Passive (2 servers)	Academic File and Print	Dual P3 1.4 GHz	Plan to replace Summer 2008
Bass	Storage only	Administrative Software	N Class machine	Obsolete. To be decommissioned at completion of Banner
CGateway	None	Citrix Gateway	Xeon 2.4 GHz	Current
Cod	None	Banner room scheduling server	Dual Xeon 2.4	New
Chum/Krill	Active/Active	External mail gateway	Xeon 2.4 GHz	Current

Server Name	Redundancy	Purpose	Technology Level	Status/Plans
Eel	None	Library Collections	Sunfire v240	New
Escher	Active/Active (3 servers)	VMWare ESX	Dual AMD Opteron 2.8 GHz	New
Gar	None	Luminis Platform (myCuesta)	Dual AMD Opteron 2.6 GHz	New
Ghostfish	None	PC Tech Imaging Server	1.7 GHz P4	Approaching obsolescence, sufficient for current use
Glop	None	Backup Server	Dual P3 1.1 GHz	Plan to replace Summer 2008
Grisfisk	None	Camera Server	Dual P3 1.2 GHz	Obsolete
Grunt	None	Mac System Administration	Core2Duo XServe	Current
Lamprey	Active/Passive (2 servers)	Database Server	Dual P3 1.26 GHz	Plan to replace Summer 2008
Mermaid	None	Academic Web server, Other Web Services	Dual P3 1.26 GHz	Obsolete Plan to move to VM
Milkfish	None	PC Tech Imaging Server	2.6ghz Celeron	Old beige box
Nautilus	None	Netop Gateway	Dual P3 700 MHz	Plan to replace Summer 2008
Netboot	Active/Active (3 servers)	Mac Netboot	G5 XServe	Current
Pasofish	None	NCC PC tech imaging server	AMD 1.6GHZ	Approaching obsolescence, sufficient for current use
Pescado	None	Syslog	Xeon 2.4 GHz	Current
Platypus	None	Primary Macintosh File Store	Dual P3 800 MHz	Obsolete
Pike	None	Cuesta NC DC	Dual 1.4 P3	Approaching obsolescence
Polyfish	None	Instruction DC	Dual 1.4 P3	Approaching obsolescence
SardineB	Active/Active	Citrix Server Farm	Dual 1.1 GHz	Plan to replace Summer 2008
Seamullet	None	Student WebReg (production)	Dual P3 1.26 GHz	Approaching obsolescence. To be decommissioned after Banner Student.
Siren	None	Network Service Administration	2.8GHz Xeon	Current
Skipjack	Active/Passive (2 servers)	Administrative File and Print	Dual P3 1.26 GHz	Plan to replace Summer 2008
Skoll	None	DNS	P3 800 MHz	Obsolete, sufficient for current use
Stingray	None	System Administration	2.8 GHz Xeon	Current

Server Name	Redundancy	Purpose	Technology Level	Status/Plans
Toto	None	AIX System Administration	PowerPC	New
Tuna	Active/Passive (2 servers)	Exchange Server	Xeon 2.4 GHz	Plan to replace Summer 2008 to address performance issues

AIX LPAR Details

The chart below shows the AIX virtual servers that run as LPARs on one of the three AIX physical servers listed in the chart above.

Server Name	Host	Purpose	Status/Plans
Dorothy	AIX PROD DB	Production Oracle DB Server	New
Henry	AIX PROD App	Production Application Server	New
Lion	AIX Dev/Test	Dev/Test Application Server	New
Munchkin	AIX Dev/Test	Dev/Test Data Mining Server	New
Scarecrow	AIX PROD App	Production Application Server	New
Tinman	AIX Dev/Test	Dev/Test Oracle DB Server	New
Wizard	AIX PROD App	Production Data Mining Server	New

VMWare VM Details

The chart below shows the x86 architecture (Windows and Linux) virtual servers that run as Virtual Machines (VMs) on the VMWare ESX physical servers (Escher) listed in the Physical Servers chart above. The number of VMs has almost doubled in the last year.

Server Name	Purpose	Status/Plans
Admin-Print	Print shares for faculty and staff	Current
Apt Proxy	Package upgrade server for Linux hosts	New
Checkpoint	VPN server	Current, plan to move to new firewall appliance
Checkpoint Admin	Administration server for firewall appliance	New
Chub2	Student Webreg Credit Card Processing	New
cis115	Faculty administered lab server	Current
cis122	Faculty administered lab server	Current
Codling	Banner room scheduling server	New
Collegenetts	Banner room scheduling server	New
Efish	Instruction domain license server	New
Evision	Banner report generating server	New
Goldfish	Cuesta internal IIS server	New

Server Name	Purpose	Status/Plans
Kingfish	Goprint Management Server	New
LibInf	Faculty administered lab server	New
Marlin	LANDesk Server	New
Navfish	Symantec Antivirus distribution server	New
Pearlsides	Luminis Pre-Production Server (pprdmy.cuesta.edu)	Current
Rainfish	Exchange recovery server	Standby
Razorfish	Cuesta only license server	New
Seashark	Cuesta Domain Controller	New
Seamonkey	Autobahn server	New
Sftp	External only file transfer	New
Sharkbait	Listserver	Current
Skate	Web server for wiki collaboration	Current
Starfish	Web server for www.cuesta.edu	Current
Stomias	Luminis Test Server (testmy.cuesta.edu)	Current
SVN	Version control system	Current
Tetra	Research Web Survey Software	Current
Thresher-01	Instruction application server	New
Tigerfish	Cuesta Domain Controller	New
Time	Cuesta time server	New
Tunafish	Exchange email front end server	New
Tunny	Instruction Exchange server (for classes)	New
Vftp	Internal only file transfer	New
Xtender1	Banner document imaging server	New

Significant Projects Completed

The overview of infrastructure and support costs above is underscored by the list of major projects accomplished in the last year. By no means is this list comprehensive. Rather, the most significant projects are briefly listed here to give a fuller sense of the scope of effort currently engaged in Computer Services. This list includes both new and upgrade projects:

- [New] Deployed myCuesta student access portal.
- [New] Deployed the myCuesta student wireless access system as part of the Library Expansion remodel, later added to the 2100 Science Building remodel.
- [New] Supported the network build-out for the Library Expansion/Remodel and deployed over 200 new computers to offices and student labs.
- [New] Supported the network build-out for the 2100 Science Building remodel and deployed over 75 new or upgraded computers to student labs.
- [New] Added storage capacity in support of myCuesta, Banner and other uses.
- [New] Deployed a third VMWare ESX server to support the rapidly expanding virtual server infrastructure noted above.
- [New] Coordinated and implemented the LiveScan fingerprinting solution for Public Safety.
- [New] Accepted responsibility for the Audio Visual Support department (formerly ITS.)

- [Upgraded] Increased and regularly scheduled PC Support staffing at the South County Centers.
- [Upgraded] Deployed three new Polycom video conferencing systems.
- [Upgraded] Replaced two obsolete NC servers with two newer servers.
- [Upgraded] Deployed a new 100MB/sec data communications circuit between the SLO and NCC campuses that more than doubled the throughput of the previous circuit.

Significant Project Plans

This is a list of the major projects in progress or planned for the coming year:

- [In progress] Continue build-out of server infrastructure to support Banner and related add-ons.
- [In progress] Continue to add wireless network access at more locations and to a greater number of users.
- [In progress] Support the network build-out for the Theater Arts Building.
- [Planned] Upgrade the NCC Wireless system to current specification as deployed on the SLO campus.
- [Planned] Upgrade the external and internal mail servers to address performance issues.
- [Planned] Upgrade the remote access systems management server.
- [Planned] Complete 10-12 server upgrades as noted in Physical Server Details table above.

Computer Services always has more work than staff to accomplish the work. Because of this, we must aggressively prioritize/triage the tasks presented to Network/PC Support. These are some of the high priority projects that have been delayed or deferred:

- [Delayed] Replace the outdated firewall with a modern, enhanced firewall cluster.
- [Delayed] Continue to expand and enhance the Storage Area Network.
- [Delayed] Upgrade the Shipping and Receiving wireless system to address reliability concerns.
- [Deferred] Deploy a host-based intrusion detection security system on public servers including Banner, myCuesta, and various web servers.
- [Deferred] Implement network intrusion detection systems.
- [Deferred] Deploy network and system management console for security and performance monitoring.
- [Deferred] Deploy UPS and environmental monitoring.
- [Deferred] Build a new generator-backed data center.
- [Deferred] Deploy the BlackBerry Enterprise System to allow Cuesta employee mobile access to Exchange mail, calendar, and contact information.

One of the costs of aggressive triage is that the delay of many of these critical projects has lead to secondary inefficiencies such as having to maintain obsolete systems and having to repair systems that crash while in service.

It is difficult to precisely measure the amount of work that is backlogged. However, the effort to complete the Delayed and Deferred projects above is easily measured in several person-years. That is, it would take a single person several years with no other duties to catch up on this backlog.