Fullerton College

Technology Strategic Plan

2006 - 2011
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SECTION I  EXECUTIVE SUMMARY

Fullerton College continues to expand and upgrade its robust technology environment. With over 2000 campus desktop systems, 65 servers, and a pervasive network infrastructure it supports current classroom and distance learning courses. In recent years the upgrading of 100 classrooms to a smart classroom status with installed LCD projectors, DVD/VCR combos, sound capability and connected instructor PCs has enhanced classroom instruction. These are complemented by installed video distribution capabilities. Efforts have begun to provide wireless capabilities in new buildings, as well as across the existing campus. While much has been accomplished, the increasing role of technology in our daily lives, as well as in instructional programs, together with the increasing complexities of new technologies, leaves the campus with significant challenges for the next 5 years and into the future.

A survey of faculty, as well as feedback from other constituent groups, indicates the need to plan and budget for technology in a more formal and comprehensive way. While technology has exploded, support staff has remained stagnant, and budgets and financial processes do not support the systematic support and upgrading of faculty, staff, and student systems. The following strategic look toward the next five years and beyond details existing structures and plans, and recommends procedures and processes to support instructional and staff needs for the coming period.

Recommendations include:

- Budgets for regular upgrades of faculty, student, staff, and infrastructure systems;
- Additional staffing to support adequate service levels;
- Financial processes that support the 12 month instructional and support needs.

In summary, technology has become a critical component in generating FTES, supporting faculty in the classroom, allowing staff to operate effectively, and providing the level of support and access expected by society and our students. It remains our challenge to adopt budgets and processes to meet and exceed these expectations.
SECTION II.  OVERVIEW

A. Information Technology at Fullerton College in Five Years

- Desktop access will be at Gigabit speeds.
- Wireless access will be available in all campus instructional buildings.
- All classrooms will have smart classroom capabilities.
- All classrooms will have video capabilities.
- Unified messaging will be available to most staff members.
- Systems will be compliant with Federal/State/District mandates.

One of the primary drivers for the current infrastructure plan is the need to provide ubiquitous access. In the next five years this will take on both increased significance and increased meaning. Ubiquitous access in the next five years will come to mean the following:

For Faculty, ability to:
- Access and display needed applications in every classroom.
- Access needed applications and resources from off site (home, hotels, etc.)
- Access needed applications and resources from all campus locations without physical connections (wirelessly).
- Be contacted reliably in any location (voice, email, text messaging, etc.)
- Conduct classes in remote locations with the same capabilities that exist in a physical classroom.

For Students, ability to:
- Access needed applications from both on and off campus.
- To use appropriate campus applications and resources from off site.
- Access class notes and assignments from on and off site 24x7.
- Access needed instructional resources without physical connectivity (wireless).

For Staff, ability to:
- Access needed applications from multiple locations seamlessly, reliably, and securely.
- Protect confidential information accessed electronically in a secure, effective, and efficient way.
- Extract needed information in a comprehensive and easy to access way.
- Generate reports quickly and easily.

For Infrastructure support, ability to:
- Provide fast, reliable, and easily accessed applications from multiple locations using both wired and wireless technologies on a 24x7 basis.
- Upgrade and maintain technology components without disrupting current operations.
- Support many applications across a broad spectrum of locations and uses while preventing licensing and copyright/patent infringements at the least possible cost.
B. **Current State of Technology at Fullerton College**

The campus adheres to and meets District guidelines in its current wiring infrastructure as well as in its planned construction projects. These guidelines provide a robust communications infrastructure consisting of copper and fiber cables that allow gigabit backbone speeds, and the ability to deliver 100 Mb/s to the desktop. This is supplemented with a broadband coax capability that provides a mechanism to deliver video to and from classrooms as well as to most other major locations within buildings. Students, faculty, and staff are served by over 2000 workstations. Of these, about 900 occupy over 40 student accessible locations around the campus. All fulltime faculty (345) have an assigned desktop as do most fulltime staff members (360). Remaining systems exist in a shared environment (including about 100 laptops) and support a variety of faculty/staff instructional and administrative uses.

The campus has about 100 “smart” classrooms outfitted with a workstation, ceiling mounted projector, document camera, and DVD/VCR/VHS/sound system capabilities. There are 115 networked staff/faculty printers and 36 networked student printers on campus. Students print about half a million pages per year in classes and open labs, while faculty/staff printing comprises from 2.5 to 3 times that volume in support of the instructional and administrative functions.

The communications infrastructure is supported by over 140 switches located in 20 buildings; star connected through redundant Cisco Catalyst routers. Network security and performance is enhanced by a VLAN architecture. The campus network is structured into over 100 VLANs that provide security and specialized access capabilities. Network management and a variety of instructional and administrative applications ranging from the campus security system to distribution of desktop images are handled by almost 65 servers, the majority of which run a Windows-based operating system. E-mail capability is centered on an Exchange server providing all staff, faculty, and students with campus e-mail addresses.

The campus supports WebCT as its primary course management system and offers over 200 distance learning online and hybrid courses. The campus network is extended to and supports the School of Continuing Education Wilshire campus with its associated classrooms, workstations, and staff. The campus network is connected by a T1 circuit to the Cypress campus and a T1 circuit to the District facility for access to the Enterprise administrative system.

**Future Use Resources.**

In the next five years the campus will experience a number of changes in the physical environment, ranging from a completed parking structure to a new campus commons building and classroom office building. Other physical changes will be associated with these. The physical changes, while important, will not be the primary drivers for technology infrastructure changes that will be needed in that timeframe. The campus’s physically constrained environment places finite limits on the number of classes and students that can be supported on campus. These constraints, however, do not determine the future technology needs. Rather, these needs are driven by the continuing rapid evolution of the ways technology is changing our society, and, consequently, our students and faculty and the services they will require. In five years we will see the need to provide services to a diverse population of on and off campus students virtually around the clock. These services will range from traditional student services to online counseling as well as access to class materials in audio, visual, and data formats delivered to the students’ locations essentially anywhere in the world.
While this may appear to be a giant leap, the existing physical campus communications infrastructure is well poised to meet this challenge. With a solid core of reliable equipment, what remain are the human resource and financial commitments as well as the vision to make the transition.

While the existing physical communications environment is in a good position to evolve toward meeting future needs, the situation is complicated by the myriad of applications and associated licensing structures, as well as the constantly increasing resources devoted to protecting the environment from a variety of threats. In addition to these complicating factors, there are evolving legal communications requirements that address issues ranging from identity theft to data encryption. In the educational arena, technology use has exploded in all areas in what once was primarily the domain of the engineering sciences.

While the world seems to be physically smaller with regards to travel and interaction between societies and cultures, the information domain has expanded exponentially. From satellite data, to measurements from the depths of the oceans, to personal blogs, there seems to be no limit to the amount of information that will be available on the World Wide Web. It is not the physical access, but rather the navigation of this uncharted ocean that provides the challenge for an educational institution. This, coupled with the evolution of the mobile student connected wirelessly to their peers and mentors, will shape the needs for Fullerton College and other higher education institutions in the near future. It is not so much what we do, but rather how well we do it, and whether or not we can provide it when and where it is needed that will determine our success as an institution.

To meet the challenges that face us in the next five years, the following physical, financial, and operational issues must be addressed:

**Physical**
- Create and implement a robust plan for providing appropriate wireless capability for the campus.
- Implement a power and equipment plan to support 24x7 availability.
- Implement equipment and processes to provide application license administration to minimize licensing costs.
- Complete equipment, training, and implementation of campus video delivery system.
- **Evaluate, acquire, deploy, train and maintain an Intrusion Detection System to provide notification of zero-day threats**.
- **Provide software license servers to allow multiple departments to share software licenses campus-wide. Consolidate software licensing and purchasing**.
- Acquire and configure redundant PIX replacement (ASA 5500 series Adaptive security appliance).
- **Upgrade Exchange and Active Directory to the latest version**.
- Acquire and implement the Tiered Data Storage Initiative (built-in data progression so most frequently used data would be stored on faster storage while lower priority servers would be on SATA disk array, etc.).
- Deploy the next version of the portal and website with design focus on usability, marketability, and reliability. Hire a design consultant to provide image and usability design spec. The portal will be the interface where students and faculty are able to access all FCNET resources within a consistent format.
• Develop and deploy the next version of the account generation: focus on testability to improve reliability of the system.

Financial
• Create a budget for the ongoing upgrade and replacement of campus workstations on a regular, rotational basis based on accepted standards.
• Create a budgeting mechanism for supporting approved equipment and applications maintenance costs.
• Create an approval mechanism that reflects all the costs associated with an approved technology equipment or application purchase.
• Create a staffing plan that reflects the support and service level expectations of the campus.
• Consider other options to non-credit funding of lab aides.

Operational
• Test and implement a production process to support the campus video delivery infrastructure.
• Implement application distribution and installation procedures that support relocation of limited software application licenses as needed.
• Provide on-call assistance to troubleshoot and resolve problems in a near real time fashion.
• Provide ongoing training for staff to support and service an increasingly complex technological environment.
• Provide staff development resources to assist faculty in integrating technology into their classrooms.
• Create a formal plan for integrating technology into the curriculum.
• Create a disaster recovery plan for technology services.
• Implement automatic change-tracking to track configuration changes to the network and applications.

C. IS Alignment with Fullerton College Strategic Goals and Objectives
Broadly speaking, the campus goals fit into the following categories:
• Continued growth in enrollment to meet the needs of the community.
• Strong focus on student success at their desired objectives.
• An effective, efficient organizational structure.
• A secure and healthy environment for students and staff.
• Exemplary management of funds and resources to meet the needs of students, instruction, and administration.

The services provided by ACT align directly with these goals. Technology is the fuel that drives the engines of both instruction and administration, and allows the campus to provide students with near real time access around the clock to needed applications. With over 100 smart classrooms, and computing systems on every faculty and staff desk, technology complements and enhances the students’ educational experience on a minute-to-minute basis. Open labs, robust Library and Skills Center access, Graphics and CAD labs, as well as distance learning capabilities, provide continuous round-the-clock access for student support.
Additionally, technology resources allow more efficient organizational structure through networked energy management systems and security systems, as well as access to financial, purchasing and human resource systems. Computing technology also supports real time financial management as well the ability to approve, track, and review the use of campus funds and resources. Essentially every function from class scheduling to ordering textbooks is enabled and supported by technology applications.

With limited physical space, the goal of continued growth can only be achieved with the optimizations and applications provided by technology. From video streaming and distance learning applications, to optimized allocation of classroom space, one can only hope to manage the inherent intricacy by the complex analyses available in computer modeling and simulation. Thus, the IS function serves as both the supporter and enabler of achieving the campus goals.
SECTION III. STRATEGIC PLANNING PROCESS

A. The IS Strategic Planning Model

The strategic plan is a framework for carrying out strategic thinking, direction, and action leading to the achievement of consistent and planned results. Each element of the strategic plan interrelates to form an important management tool for determining the basic nature and concept of an organization, the overall direction or strategy for fulfilling that concept, and a roadmap for carrying out the strategy and achieving long-term results.

The IS strategic planning process provides an ordered set of steps designed to culminate in the development and execution of a comprehensive IS strategic plan.

1. THE IS STRATEGIC PLANNING MODEL
B. Assessment

Assessment is the activity of developing a clear and thorough understanding of the organization situation from both an internal and external perspective. Assessment culminates in the identification of “conclusions” that pinpoint critical issues requiring strategic attention. Two major sub-steps, *positioning and situational analysis*, are used to generate conclusions. *Positioning* provides a graphical way to understand the “position” or state of information technology in all relevant strategic areas. *Situational analysis* is the use of various analytical methods to interpret the data about the organization and its environment. Assessment is both a data-intensive and analysis-intensive activity.

The ACT Advisory Committee conducted an assessment that included faculty and staff surveys and a review of current documentation: Master Plans; Accreditation Institutional Self Study reports; the state technology plans; and the associated CCC Total Cost of Ownership (TCO) model. Strategic goals were targeted and representatives of the campus community were invited to evaluate the importance, impact and benefits to the college. The current information system environment at Fullerton was assessed to identify effective technology solution objectives that take the current IS infrastructure into consideration, provide long-term benefits, and position the college for future advanced technologies.

C. Strategy

Strategy consists of identifying strategy statements for the organization, the specific objectives to be achieved, and the strategic moves needed to realize the future state and objectives. *Objectives* describe what we wish to achieve. *Strategic moves* are prescriptive, identifying the actions to be undertaken. To realize the objectives, a commitment plan to focus organizational attention on the objectives and a change management plan to anticipate and reduce resistance to change are necessary.

The ACT Advisory Committee formulated our final strategic goals and specific objectives which need to be achieved. The estimated “Total Cost of Ownership” for each objective has been identified to provide a benchmark for funding and the development of individual tactical plans in support of each objective.

D. Execution

Execution is the action of putting the plan into motion. It is the translation of intent into reality. Strategies are made operational through implementation programs that are partitioned into multiple projects. Projects achieve objectives and interim objectives called *goals*. The success of the execution step depends on the commitment and change management plans designed in the strategy step to minimize barriers and obstacles. Tactical Plans are actions and details that need to be taken to implement each initiative. Tactical Planning should be sensitive and responsive to the evolving environment. Upon the successful approval for funding, the execution process will deliver the necessary details for accomplishing each project successfully.
SECTION IV STRATEGIC OBJECTIVES ANALYSIS

The Fullerton College Academic Computing Technology staff has done a credible job of supporting newer technologies despite the limited availability of funds for equipment, software and formal training. The number of staff hours necessary to provide quality support exceeds the current human resources capacity to support the growing needs of the faculty, staff and students who rely upon information technologies to accomplish their daily vocations. The demands for providing student, faculty and staff access to information systems and the Internet throughout the campus have resulted in the college implementing a new high-speed fiber optic network connecting all campus buildings to campus systems and the Internet. It is the expansion of the network and increased access to information by a wider population of faculty, staff and students that has fueled the increase in use of and demand for more services and support. The development of distance learning continues to offer exciting results and the continued development of video streaming to the desktop is the natural progression of this technology. The following goals and objectives are meant to advance IS delivery and access for the campus community efficiently and effectively.

A. Baseline Support Systems

Baseline Support Systems is the continuing growth of access to computers and training for students, faculty and staff. The goal is to support the college mission by providing access to needed instructional resources to a diverse and distributed student population, and to achieve the ratios specified by the CCC Technology II Plan.

1. Increase the number of computers for students, faculty and staff
   Make state-of-the-art computers available for student access that will maintain a ratio of 1 computer for every 20 full-time students. Ensure a baseline of computer access that agreeably accommodates students with disabilities. Maintain faculty access in a ratio of 1 computer for each full-time faculty and provide easy access for every part-time faculty. Achieve a three year refresh cycle for faculty and staff systems. Computer access will be provided for 80% of the full-time staff.

2. Continue to refresh technology
   Budget for and identify a plan to refresh computers and software in three year increments that continues to meet the evolving standards for technology growth, student development, faculty instruction and curriculum development, distance education support, and staff productivity.

3. Advance the level of training for staff and faculty
   Staff development workshops will be established with schedules posted that allow for the ongoing training of faculty in the use of information technology tools. This objective depends upon the commitment of the college to provide the necessary space for support of training. The current space allocation and staffing is not adequate to accomplish this goal.

A variety of instructional approaches will be offered such as:

- Train-the-trainer, to allow academic and administrative departments to have internal training flexibility.
- Access to computer-based training courses.
- Workshops with faculty, administrative staff and technical staff.
- Collaborative technology discussions.
4. **Local and Distant Communications support.**

Fullerton College is supported by a gigabit campus-wide Ethernet backbone that supports 100Mb connectivity to wired desktops. The network is logically divided into staff and student VLANs to optimize security. Internet connectivity is through a T3 connection to 4CNET. Video services on campus are achieved through a coax distributed broadband system that is supported by Digital Network’s technology. Strategic initiatives include greater use of streaming video, as well as video-on-demand in the classroom. Limited staffing and budget are significant constraints on achieving progress in these areas.

5. **Lab Support**

Students at Fullerton College have access to five computer labs; these labs are open during all campus operating hours. Three of the computer labs are designated as general use labs and have software and hardware to support the educational spectrum. The other two labs are designated as special use labs: the 720 lab supports the Technology and Engineering and Natural Sciences divisions with software and specialized hardware for the CAD, Construction, and Horticulture programs; the 1024 lab supports the Fine Arts division with both Mac and PC platforms running applications for the Computer Graphics program. Both specialized labs are also available to all students for basic computing such as word processing, Internet access, etc.

With the exception of the 720 lab, these labs each have a classified Instructional Assistant in addition to a student or adult hourly aide. Instructional Assistant staffing is not available for evenings or weekends. During those times, the labs are in the care of hourly workers.

In addition to the open labs, the campus has over 12 computer classrooms. These classrooms enjoy a full complement of computers and are supported by faculty and staff. They allow students to deal with complex problems during classes with both Internet and printing capabilities. These classrooms are an integral part of many campus programs.

As more academic departments utilize technology in support of their curriculum, student use of the labs and classrooms will continue to increase. In order to provide service to these students and to the faculty who use the computer labs, the following will be required:

- A consistent, ongoing budget that adequately addresses the need for new and replacement equipment, software and hourly staff.
- Commitment from the campus to refresh the lab computers on a cyclical basis.
- Additional Instructional Assistants to provide consistent service to students attending classes in the evenings.

6. **Help Desk**

As the technology customer base has grown, ACT has responded by implementing a Help Desk. The Help Desk is crucial to making the organization function in a productive, vital way. Currently staffed by student hourly during limited hours, the service is particularly critical for “off hours” assistance to students and adjunct faculty who access the campus technology services after campus offices have closed. As demands on the time of the ACT classified staff continues to increase, the Help Desk allows for the optimization of available staff hours by being the initial point of contact for callers, providing assistance with and
answers for common technology questions and providing system status overviews to ACT technicians and campus staff, thus allowing ACT classified staff to focus on their core duties.

Even given its limited availability, the Help Desk has already proven successful. To continue this success, and to promote the goal of assisting all faculty, staff and students with access to technology will require:

- A structured staffing mechanism to provide a consistent knowledge base.

### 7. Phone System

With the technological evolution of phone systems, ACT assumed responsibility for the campus-wide Avaya phone system in 2004. Subsequent planning began the process of upgrading, moving and merging phone functionality with network connectivity. The campus acquired and began moving locations to a Cisco VOIP call manager system. The phone system is becoming more than just a way to receive voice messages. With the addition of Voice over Internet Protocol (VOIP), it is now an integrated messaging system. By integrating voice and email messaging, along with all of the other functions of VOIP technology, the campus will be able to conduct business more efficiently. At this time, the campus operates with two phone systems. As new buildings come on line they will be able to immediately use this enhanced technology. As budgets allow we will continue to move sections of the existing campus from the Avaya to the VOIP systems. This is another area where the campus strives to provide enhanced capabilities in a cost effective and efficient manner.

### B. Access

Ubiquitous access provides faculty, students and staff easier access to Fullerton College’s network and computing resources from any location on the campus or via the Internet. This advancement goal will extend access to campus information systems and allow for improved control of the infrastructure. The campus is committed to providing access that is compliant with Federal Sections 504 and 508. The following mechanisms will help support these goals.

- Remote access service using the Internet. (VPN)
- Active Directory.
- Wireless access on campus.

#### 1. Remote Access Service Trends

As systems and functions disburse across the campus and beyond, and become more complex in the process, the need to provide timely support increases. Both distance and complexity mean the need for support staff increases non-linearly. In order to provide support, existing staff must find better ways to provide this support. Remote access tools allow resources to be managed without necessitating physical proximity or access. Although the use of such tools reduces the need for additional staff, the need for additional training as well as the support requirements for the tools themselves remains. It is clear that additional support resources are required if we are to support the required technologies.

#### 2. Directory Services and Authentication

The campus uses Active Directory, an industry standard to support authentication, directory services, and user account management.
3. **Wireless Access**

Wireless networking is rapidly reaching maturity and its deployment at colleges has the potential for radically changing the way they do business. The significance is that students and faculty will no longer be constrained by requiring a connection to a fixed network location in order to access network resources. Wireless networking allows them to work anywhere on campus with a notebook and wireless network interface. Our feedback from the campus community indicates support for the use of wireless LANs as a means for extending access to information throughout the college campus. Wireless networks provide the flexibility needed for the types of applications where installation is temporary; systems are set up and taken down quickly, such as student registration automation systems, offices, temporary labs or sites located beyond the campus cabling standard. Establishing a campus-wide wireless network will reduce the need for students to stand in line for access to information.

**Benefits**

- Mobility
- Cost savings
- Solving difficult-to-wire Solutions
- Reduced installation time

**Long Term Cost Savings**

Departments reorganize, resulting in the movement of people, new floor plans, office partitions, and other renovations. These changes often require re-cabling the network, incurring both labor and material costs. The advantage of wireless networking is that one can move the PC without the additional step of rewiring.

**Security**

The IEEE 802.11b communication standard offers several layers of security. At the lowest level is the System ID, also known as the Electronic System ID, SSID or ESSID. This is an identifier code that the system manager enters into the setup of all the access points and NICs that will participate in the network. The next layer of security is the access list. The access list contains the media access control (MAC) address of the systems that are authorized to access the network. The last level of access security is the use of Remote Authentication Dial-In User Service (RADIUS). RADIUS has the advantage of authenticating the user rather than the machine. Based on user identification and a password, RADIUS can be centrally managed. Any password scheme is vulnerable to careless users, but RADIUS gives the administrator a central location to disable user access to the network, which is a major improvement over previous approaches. Our preference is a RADIUS-based wireless solution to other current alternatives. The next level of security is encryption. Wire Equivalent Privacy (WEP) can use a 40- or 128-bit encryption key. It should be noted that managing WEP keys poses added maintenance and management activity.
C. Technology Reliability

1. Service Level Agreement
Currently, while expectations for service delivery exist, these services are covered by informal service level agreements or not at all. A document detailing proposed IS support services to be provided by the ACT department should focus on availability, response times for support, and change notification.

Assessed Need
A need exists under the type of distributed support structure at Fullerton College to institute formal service level management (SLM). Service level management has advantages for all parties. The end users, including administrative staff, academic governance committees, and associated student groups, would be aware of the levels of service they should expect.

Academic Computing Technologies (ACT) would gain an increased level of support management they could pass along to their end users. This will be even more important in the future as support relationships change and the campus expands its use of technology.

Recommendation
Service level agreements should be formalized in all IS areas. The current informal service level agreement between ACT and the campus results in unrealistic expectations regarding the level of support available with limited resources. Without lining up the IS end-users’ expectations with IS’s ability to realistically meet those expectations, IS stands little chance of breaking out of “IS support hell.” Overall, the perception of the ACT staff’s performance is diminished without these agreements.

The SLA process should start by saying, “Where do I need SLAs the most?”

Service levels should be established through a negotiated process between the end-user needs and ACT’s capability to provide.

A critical component of service level agreements is monitoring elements such as availability, performance, capacity, and quality (end user satisfaction). This information should be used to measure and verify system performances and deliver feedback.

All SLAs should be periodically reviewed and evaluated to ensure that the systems and organization have the resources to support the defined levels. This should be done every six months until the environment is stabilized.

Regular service level reports are recommended for the end-user in writing on a mutually agreed upon schedule (quarterly is suggested).

The following model should be used to establish a Service Level Management discipline throughout the IS organization.

In conjunction with the campus researcher, the following key performance indicators are used to measure the demand for ACT services:

1. Number of service requests received.
2. Number of student hours logged in.
3. Number of packets to/from Internet.
4. Number of e-mails sent/received.
5. Number of visits to campus web page.
6. Number of RQs generated ($ volume).
7. Number of Help Desk calls.

As examples of the trends in these indicators, the growth in the number of service requests has increased over 10% per year. Also, in the last year over 175 RQs were processed within ACT with total dollars exceeding $850,000. This is in addition to an additional 300+ technology related RQs generated by other organizations that were reviewed and approved through ACT. All the key performance indicators reveal the continued rapid growth of technology service needs that impact the limited staff resources. Service level agreements would not attenuate the need, but would help manage expectations and add support for additional resource allocations to meet the need.
2. Technical Support

The distributed nature of first level technical support at Fullerton College can assist the ACT (Academic Computing Technologies) department; however, with the continued expansion of the infrastructure, support demands are exceeding the current staff’s ability to respond at a satisfactory level. This becomes especially important because Fullerton College plans to improve the IS support scope by extending support coverage to 7/24. Technical support staff are essential to the successful diffusion of information technology throughout the college. A serious problem exists throughout the college in providing enough support to individual departments to help them maintain their computing resources; this also poses a serious security concern. Academic department staff that are responsible for the initial troubleshooting of technology problems need to participate in ongoing training provided by the ACT department. Participation in ACT support training programs will improve department expertise and reduce trouble reports to ACT. While the local support provider approach is good, more training is also needed for both faculty and staff.

Assessed Need

The issue of resources necessary to support and manage a growing organization is apparent. It is imperative that resources are organized in such a way as to provide the services currently required and to be able to grow as the need presents itself. There have been periodic incidences where services were lost unnecessarily. The use of outside resources can assist with resolution times for third level problems when core technical support staff are stretched thin. Expansion of support to 7/24 is going to require inclusion of a third party outside support organization to assist with the technical support solutions.
**Recommendation**

There has been a great deal of research done on the optimum ratio of support personnel to the end user community. The reality is there can be significant variation in support levels between organizations due to factors such as the complexity of the applications and the stability of the platforms running the applications.

A recent study indicated that for private industry the average Tier 1 support ratio is approximately 80 to 1. Or stated in other terms, for every eighty desktop systems (usually referred to as “seats”) there should be at least one help desk representative providing Tier 1 support.

In an academic environment, the ratios are generally much higher. One of the major reasons for this is that a single PC in a classroom may be less of a problem than a PC that is on the desk of a business or administrative user, or even in a PC lab. One PC out of service awaiting repairs does not severely limit the mission of the lab. The information provided below is based on our own research into the appropriate Tier 1 – Tier 3 support levels to seats ratio for academic and administrative users.

**Fullerton College Support Gap Analysis**

The CCC Technology II Plan establishes guidelines to effectively support information systems delivery to the campus environment. The following model represents where Fullerton’s IS support is in comparison to the goals of the Technology II Plan.

<table>
<thead>
<tr>
<th>Systems Management</th>
<th>Support Category</th>
<th>Technology II Assumptions</th>
<th>Fullerton College Campus Statistics</th>
<th>Current Staffing</th>
<th>GAP Additional Staff needed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Network and Systems Administration</td>
<td>1 staff/300 PCs</td>
<td>2,000/300 = 6.6</td>
<td>3</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td>Technical Management</td>
<td>1 staff/500 PCs</td>
<td>2,000/500 = 4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Web Administration</td>
<td>1 staff/12,000 FTES.</td>
<td>14,500/12,000 = 1.2</td>
<td>.5</td>
<td>.7</td>
</tr>
<tr>
<td></td>
<td>Administrative Systems Support (Web, User development) Applications</td>
<td>1 staff/12,000 FTES</td>
<td>14500/12,000 = 1.2</td>
<td>.5</td>
<td>.7</td>
</tr>
<tr>
<td>Support Type</td>
<td>Staff/Hours</td>
<td>FTEs</td>
<td>Cost Rate</td>
<td>Period</td>
<td>Level</td>
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<tr>
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<td>14500/6,000</td>
<td>1.0</td>
<td>1.4</td>
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The GAP analysis shows that the current direct technical IS staff at Fullerton College needs to be expanded from 17.5 to 34.7 people to meet the goals of the CCC Technology II Plan.

As the number of seats grows and the support hours widen from the current schedule of Monday through Friday to include weekends and evening support (18 hour days), the staffing levels must be augmented as required to provide full coverage.

**Establishing an external third level support resource**

Using an external support organization has been popular for decades. Turning over a project, a system problem or ongoing management responsibility, to a professional service company can take the heat off of an understaffed IS department. External support organizations can spread the cost of technology or services among multiple customers, add instant expertise to campus staff, and fill other needs which are otherwise beyond the reach of the college information systems.
organization. There is a need to expand support for information systems at Fullerton College and the inclusion of an external third level support resource would make possible the adoption of new technologies beneficial to the college community.

Benefits:
1. Flexibility for addressing fluctuating IS demands.
2. Effective support solutions.
3. Instant expertise for critical solutions.
4. Staff retention.
5. Reduced costs for after hours support.

The key to establishing a successful external third level support resource is to understand the total scope of technical expertise provided by the organization and to ensure that they are non-biased when it comes to solutions and manufacturers. The college must negotiate a response time within which the organization will provide the appropriate technical support, such as two hours on 7x24 availability. Finally, a block of expected support hours to be used for this service should be negotiated along with the pricing, terms and conditions.

D. PROCEDURES

1. Policy Establishment
A formal IS Security Policy helps to establish standards for IS resource protection by assigning program management responsibilities and providing basic rules, guidelines, and definitions for everyone at the college. Having a policy helps prevent inconsistencies that can introduce risks and serves as a basis for enforcement of detailed rules and procedures.

There is a need to secure the administrative environment in general, but a need for “academic freedom” as well to support the educational mission of the college. This makes the implementation of a single monolithic security policy difficult. A balance between security requirements for administration and academic freedom needs to be established.

The importance of creating a security and access policy that reflects both the needs of the academic community and administration cannot be stressed enough. It is a standard against which security audits are measured and will also help in future security purchasing decisions. A security policy should cover the following items and follow a layered approach similar to the OSI reference model.

- First, the basic access requirements are stated.
- The physical security should be discussed: How are systems and network infrastructure equipment physically accessed? Are they locked up 24 hours a day; is there a badge reader on every wiring closet?
- The next level of security is network access; this includes remote access as well as local. Who should have access to the network; who has administrative responsibility for the network?
- System security includes both password policies and user account management. Application and data security, which is very similar to system security, can sometimes be treated the same. The system security section should address the need of faculty to provide “services” on their personal computers; Personal Web Server (PWS) is the primary example of that.
− There should be a security audit requirement. Regular audits of all parts of the security policy should be regularly conducted. They should be conducted by a separate or outside organization, not the IS support or facilities group.
− Finally, there should be a group or person assigned the role of information security office(r) responsible for campus-wide information security; this can be either a technical security specialist, a manager with oversight capability, or both.

**Best Practices**

1. Security and complexity are often inversely proportional. Every step taken—whether it is vulnerability and risk assessment, security policy and procedure development, deployment of mechanisms, or user education—should be as straightforward and simple as possible. The more cryptic the instructions and procedures, the more room for misunderstanding and misapplication.

2. Security and usability are often inversely proportional. There is no such thing as "complete security" in a usable system. Consequently, **it is important to concentrate on reducing risk, but not wasting resources trying to eliminate it completely.** A pragmatic mindset provides a fighting chance to achieve fairly good security while still allowing productivity.

3. Good security now is better than perfect security never. This is a corollary of the previous axiom, since perfect security doesn't exist in a usable system. Even if it were possible, a usable system is a moving target: Threats change, technologies change and college needs change. The job is never finished.

4. A false sense of security is worse than a true sense of insecurity. Knowing the enterprise is still insecure provides a framework for moving ahead. It is critical to know where gaps exist, what documents and procedures are not quite right, and which mechanisms need replacing. A false sense of security does not motivate improvement— or even analysis—of an organization's security posture. It leads to false complacency, which can give rise to disaster, often accompanied by the lament, "I thought we had that covered." It is better to know where the system is weak, avoiding unquantifiable risks.

5. The security system is only as strong as its weakest link. Therefore, the organization needs to be thorough in its examinations and evaluations. For example, if there is a reason to employ VPNs (virtual private networks) to keep connections private from home and remote offices to the college, it may be necessary to protect that data while it resides on the notebook PCs of the mobile workforce. It may mean removing modems from desktop computers, requiring all traffic to flow through the firewall.

6. It is best to concentrate on known, probable threats. There are imagined threats, real threats and probable threats. In addition, there are known and unknown threats. We are most interested in real and probable threats, while we continue to expand the set of known threats.

7. Security is an investment, not an expense. The challenge is to make this point to campus decision-makers. Investing in computer and network security measures that meet changing academic or institutional requirements as well as address risks makes
it possible to satisfy changing campus requirements without hurting the educational system's viability. Improperly configured systems lead to data loss or worse.

The Internet is a worldwide network used by people of diverse cultures, political philosophies and personal values. When academic institutions embrace the Internet as a vast resource of information the necessity of having a security policy becomes imperative. Absence of a detailed security policy at Fullerton College increases the risk of damage to the college’s information assets and could result in an embarrassing situation for the governing administration. There are ways to preserve “academic freedom” while ensuring the protection of administrative information. The first step is to establish a security policy and then to communicate it to the college community.

2. Network Management
Expanding access to information systems at Fullerton College increases the college community’s ability to be successful, while the use of wireless access presents concerns about security and the appropriate use of information systems. To reduce this risk a managed approach should be implemented that addresses the need for secure mobility within the campus environment. This approach should provide the ability to segment different user populations, yet still provide full mobility to all groups.

Cisco Network Access Control (NAC) is a set of products that controls access to the campus LAN. NAC allows for campus mobility, not only for IS support personnel who are locating users and their personal workstations together, but also for areas that have "walk-up" computing environments where the workstations are placed in fixed locations but are accessed by different users. For a typical example of a walk-up environment such as a college learning lab, NAC identifies users based upon their login names and not the PC they reside on and places them automatically into their logical workgroups. This setup helps tighten network security, and keeps unauthorized users off secured subnets.

The Cisco NAC suite is a solution that includes an intrusion detection mechanism to enforce the specified security policy. NAC addresses the need for managing Fullerton’s secure mobility within a campus by providing dynamic assignment of Virtual LANs (VLAN) based on a PC user's login. PC users can attach to the network at any available port and be automatically assigned to the appropriate VLAN. Guest users are restricted to a limited set of information system resources, whether they login to a shared PC or plug-in using a laptop. This capability is especially useful in situations where it is desirable to segment the traffic of the different academic communities yet still provide full mobility to all groups.

Benefits

1. Campus access security is based upon user-to-VLAN associations.
2. Substantial reduction in network administration expenses.
3. Integration with DHCP-enabled networks.
4. VLAN administration with user login names.
5. Elimination of MAC address and protocol-based VLAN administration.
6. Robust solution for walk-up computing environments.

As the campus IS environment grows, adopting the Network Access Control suite (Cisco Corp.) as a solution will provide an effective control mechanism that supports student access to
information systems while ensuring that a responsible approach is used to control student access using a seamless solution.

E. **IS ORGANIZATION**

1. **Resource Alignment**

Information Technologies are influencing the campus environment at Fullerton College where a majority of the technology oriented academic departments are recognizing and embracing the benefits. A key component to this change has been the expansion and upgrade of the campus Local Area Network (LAN). First level assessment is maintained by some individual academic departments with a higher utilization of computers, applications and classroom technologies in their areas. The Academic Computing Technologies (ACT) department is relied upon to provide first, second and third level support, technology training, learning laboratories management, Website development, Infrastructure cabling, network access, administration systems, applications, and desktops. Voice technologies such as the campus telephone system (PBX) are also the responsibility of ACT. This changed with the convergence of voice and data services onto one transport media and is recognized as the industry direction due to the associated cost savings and efficiencies that organizations are realizing.

ACT anticipates the continuing convergence of voice and data services onto the campus LAN infrastructure in the next 2-3 years. The convergence of voice and data will benefit the college and combine the voice and data technical capabilities together. ACT will represent a unified efficient technology management organization and Fullerton College will realize the economic benefits of converging its voice and data services together.

Meeting the needs of the campus community in an effective and efficient way requires adopting an organizational approach that is flexible and responsive but above all fosters the development of the ACT team. A Matrix organization approach accomplishes these goals through the addition of a cross-functional task force that responds in a collaborative way to meet the demands of the college information service and support needs. The cross-functional task force is designed to include technical staff from each ACT group with the goal of responding to the pool of service and support requests that are received on a daily basis. The Matrix organization approach emphasizes customer service across the organization, while allowing the more experienced technical staff to focus on development and third level support issues. The ACT organization will change to reflect this approach.

2. **Help Desk Development**

As the demands for support increase, the ACT department will formalize their processes, procedures and, most important, the customer support approach. ACT’s objective is to deliver “World Class” customer service which is a blend of personal and procedural strategies. Currently, the college community reports IS problems to ACT by either calling the Help Desk support phone number or completing a problem report using the campus website. The customer does not always know status of their request or when to expect service. The following model represents the four types of customer service.
**The Factory**
Message to our customers, “You are a number, we are here to process you”

**The Four Types of Customer Service**

**The Freezer**
Message to our Customers, “We Don’t Care”

**The Friendly Zoo**
Message to our Customers, “We are trying hard, but we don’t really know what we are doing”

**World Class Customer Service**
Message to our Customers, “We care and We Deliver”
The challenge of any information systems department is to manage end-user perceptions about the quality of service provided by the IS organization. There is a high expectation for service response and delivery and low tolerance when it doesn’t occur. No matter how advanced the technology environment is, the perception of whether or not information systems are being delivered successfully is influenced by the quality and responsiveness of the Help Desk. The ACT department has not had the resources to advance this area of their operations and it has resulted in negative feedback and perceptions from the general college community. The success of this objective will reverse the perceptions of service at the college and encourage the addition of new technologies.

Managing a help desk can be like running an emergency medical center in a rough neighborhood with no supplies during an epidemic. However, as in health care, practicing preventative care is more efficient. The Help Desk has evolved to become the strategic center of information systems departments. Rather than assuming a reactive role, help desks should take a proactive role in solving campus IS needs. As one help desk manager says, “The best call is the call that is never made.” The strategic help desk minimizes incoming calls by anticipating and addressing user problems before they occur. Communications is the cornerstone for delivering world-class customer service and the college community must always feel that they are important and ACT is responding.

SECTION V. Total Cost of Ownership Estimates

The Total Cost of Ownership (TCO) concept assumes a relationship between computer hardware/software and support. TCO is a method of determining the full cost associated with owning and using technology in the Fullerton College environment. According to “Gartner Group” research, the initial cost of hardware and software represents only 30 percent of the TCO. The following TCO model is based upon the TCO model determined by the CCC Telecommunications and Technology Advisory Committee (TTAC) and Gartner Group. The TCO model is designed and constructed to be reviewed and analyzed on a continual basis to reflect the ongoing changes and costs as they relate to equipment, software, training, and support personnel. By using the Gartner Group TCO concepts and models, Fullerton College has developed its own cost model reflective of the objectives contained in this Strategic Plan.

The spreadsheet attached as Appendix 1 details the existing technology components, costs, and 5 year growth. Using the existing base one can construct required support scenarios. The following tables summarize the non-labor budgets required to maintain a consistent up-to-date set of technology components on either a three, four, or five year cycle. These are based on the current in-place technology and must be adjusted upward for the projected 5 year growth detailed in this document.
## Technology Strategic Financial Plan

### Option 1

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SECTION VI  CONCLUSION

Fullerton College faces a fiscally and technologically challenging period for the next 5 years and beyond. Significant effort and progress have been made in implementing and maintaining state of the art technology projects. In addition to the technological challenges associated with rapidly advancing technology, the campus is faced with meeting comprehensive Federal and State accessibility mandates. With a robust network infrastructure and over 100 technologically advanced classrooms, as well as a comprehensive set of workstations for students, faculty, and staff, the campus is well positioned to support current needs. At the same time the rapidly changing technology landscape requires significant effort and calls for significant additional resources.

Real-time technology on the move is the best way to summarize the near term challenges. With increasing numbers of laptops, PDAs, IPODs, cell phones, and distance learning opportunities the need to provide wireless and 7x24 access to instruction and instructional support is a clear need. At the same time existing staffing and financial processes do not support a 12 month round the clock, predictable, stable, and effective support environment.

This report summarizes the vast technology investment already made, and details the changes and resources required to meet these future needs. It remains with the campus and District decision-makers to address those needs in consonance with our mission and goals and to create associated support mechanisms that allow for those goals to be achieved.