Campus-Wide Technology Assessment

Version 1.3

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1.0 Executive Summary

1.1 Project Background

In March, 2008, Victor Valley College (VVC) engaged PlanNet Consulting to conduct an enterprise-wide assessment of their information technology. Over a period of 16 weeks, PlanNet conducted a series of surveys and interviews with VVC management, faculty and staff, and gathered and analyzed various technology documents. This report presents the findings and recommendations from our assessment.

1.2 Summary of Findings

Infrastructure

- The VVC network and web infrastructure design does not meet the stated 7 x 24 availability service levels
- VVC has no plan, process or budget to refresh vital network equipment
- There is little or no policy, procedure, or general documentation for the campus network, servers or applications
- The instructional technology support area is insufficiently staffed and trained to meet its mission
- VVC end-users are insufficiently trained to use classroom instructional technologies
- Lack of instructional technology standards has created an unsupportable and ineffective environment

ADA

- VVC does not have a program for ADA compliance; this includes accessibility standards for hardware and software, and training of both support staff and end-users
- There are no ADA course content standards

Business Continuity

- There is no business continuity capability / program
- VVC has insufficient storage infrastructure and backup capability to ensure data recovery
- Industry accepted storage management practices are not being employed
- The existing high availability scheme does not seem to address core applications

Technical Services Organization Staffing

- Almost all Technical Services departments are understaffed
- There is little or no professional development and effective staff evaluation processes
• VVC lacks technology leadership
• The lack of a functional help desk handicaps the ability to properly load resources and respond to demand
• Lab support is decentralized, staffed above state chancellor’s office guidelines, and generally under-utilized
• Telecom technicians are not adequately trained
• Web support lacks formal governance and standards
• MIS is unable to respond to a strategic initiative to extend Datatel to a fully functional ERP
• End-user training is not occurring for key enterprise systems

**IT Services**

• VVC lacks a well articulated catalog of services
• Operational processes are largely ad hoc and are not based upon documented standard operating procedures
• The college lacks effective IT governance
• Fundamental IT policies are not defined
• Industry accepted project management and IT delivery methodologies are not utilized
• Technical Services does not have an effective communication plan
• The IT help desk has insufficient structure and processes to effectively support VVC

**Application Performance**

• VVC lacks formal benchmarks for performance
• End user satisfaction surveys indicate that application performance has been remediated from past issues to acceptable levels
• Blackboard performance and capabilities are generally regarded as suitable to VVC’s needs
• Faculty represent that a critical lack of Blackboard training has impeded enhanced online curriculum development
• There is no formal communication plan to notify end users of system outages
• Staff and faculty are frustrated with the limited feature set of GroupWise Web Access
• Financial systems management is satisfied with the Financial 2000 software suite
• Snow White is operating on an unsupported, obsolete platform

Registration

• WebAdvisor is suitably customizable and extensible for future registration needs
• VVC experiences an excessive amount of walk-up registrations
• Use of telephone registration is significant
• Student information kiosks reduce some walk-up registration traffic
• VVC does not offer priority registration or course wait-listing

1.3 Recommendations and Roadmap

PlanNet recommends the following actions. The schedule of activities will be determined by VVC resources and priority.

Phase One

PlanNet recommends hiring a cabinet-level chief information officer, establishing a new IT governance structure, and developing core IT policies. The college should also establish a district-wide IT communication plan.

Organizationally, VVC needs to establish an IT service desk and staff several new positions. From a process perspective, the college needs to publish a clearly defined catalog of IT services with stated service level objectives and technology standards.

In the area of infrastructure, an appropriate SAN backup and recovery solution needs to be architected and off-site tape storage solutions need to be deployed.

Immediate gains in application performance can be achieved by modifying specific file resizing activities for Datatel and by implementing secure protocols for GroupWise.

Phase Two

Expand governance to include Web Design and Information Assurance task forces.

VVC should restructure all instructional technology resources under the Dean of Instruction. Training programs for staff and faculty should be implemented as well as specific budget allocations for professional development.

PlanNet recommends the establishment of standard IT methods and procedures, to include change, configuration and capacity management processes.

A redundant network core should be deployed and end-of-life hardware refreshed. PlanNet also recommends a secondary path to the Internet.

In the area of application enhancements, VVC should implement a web content management system, a decentralized report writing utility, and a more robust ticket tracking system. Hardware and license upgrades for Datatel are also recommended.
Phase Three

VVC should centralize all technology purchases through Technical Services.

PlanNet recommends expanding network monitoring tools to include performance analysis, alerting, and end-to-end application performance. VVC should upgrade its wireless infrastructure to redundantly support current standards.

Legacy instructional systems should be upgraded, an instructional content production facility should be established, and a permanent location found for the distance learning room. PlanNet recommends pursuing a path towards a fully functional Datatel ERP. Priority registration, course wait-listing, and a grade book program embraced by the faculty should be integrated into Datatel. VVC should distinguish its web registration experience by offering chat capabilities that put students in touch with registration advisors in real-time.
2.0 Project Background and Methodology

Victor Valley College (VVC), located in Victorville, California, engaged PlanNet Consulting to conduct a campus-wide assessment of their information technology. The project took place between the months of March and June, 2008.

The study was specifically chartered to review the following areas. For each category, PlanNet was asked to review the VVC current-state via the collection of IT documentation, through interviews conducted with key staff and faculty, and with surveys for targeted campus audiences. PlanNet resources then assessed the gathered data to identify gaps between the current-state and both industry best-practices and future-state requirements. Finally, recommendations were made for handling those gaps. These included rough order of magnitude (ROM) time and budget estimates for implementing the suggestions.

- Infrastructure. The section addresses two topics:
  - General and web infrastructure (such as servers and the network)
  - Audiovisual instructional technologies (such as podcasts and streaming media).

In addition to the gap recommendations listed above, the section also suggests the space and network management tools needed to deploy the recommendations.

- Data Accessibility
  - General. Here, the general data storage and accessibility strategies are reviewed for all departments and benchmarked against chancellor’s office standards. Proposals are made on how to better store information and how to ensure the VVC population can access that data from wherever they are on campus.

  - Data accessibility for students, staff and faculty with disabilities with an emphasis on audiovisual technologies. As above, the general accessibility strategy for all departments is evaluated and suggestions are made for better utilizing AV components and for meeting ADA standards. Specific recommendations are also made for assisting disabled members of the VVC population with better accessing the WebAdvisor and Blackboard applications.

- Business Continuity. This evaluation focuses on business continuity (BC) plans and processes with an additional emphasis on the efficiency, effectiveness, and security of backup and restore methods. It also identifies additional hardware and software to improve the recoverability of critical processes and the effectiveness of business continuity plans. Finally, it recommends improvements to fault-tolerances and high availability.

- Technical Services. Two sub-topics are covered:
  - Staffing. This portion assesses the Technical Services department’s staffing and organizational model, including the skills sets and regular activities of its personnel. Along with recommendations for handling identified gaps, PlanNet benchmarks staffing against chancellor’s office standards. Additionally, suggestions are offered for appropriate staffing levels during both regular and off hours.
• IT Services. Proposals are made in this section around improving the Technical Services department’s customer services policies, processes, and systems.

  - Application Performance. Five applications are evaluated in this report: Blackboard, Datatel, GroupWise, Financial 2000, and the HP 3000 legacy financial system (Snow White). For each, recommendations are provided for improving performance to get the app functioning at original expectations and within District-set baselines. Specific to Datatel, customizations are suggested that VVC can implement to increase operating levels, along with the training required to perform those customizations. And, specific to reporting, PlanNet discusses the benefits of centralized vs. decentralized models, and compares other reporting tools to the VVC standard, Query Builder.

  - Registration. Here, recommendations are made to improve VVC’s system of registration, including ways to better automate the registration systems. Proposals are also made to improve work flows and incentive models to encourage electronic registration methods.

The following resources were interviewed / provided documentation during this project:

<table>
<thead>
<tr>
<th>VVC Resource</th>
<th>Assessment Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peter Allen, professor</td>
<td>Technical Services - IT Services</td>
</tr>
<tr>
<td>Jon Booth, IT director</td>
<td>Business Continuity</td>
</tr>
<tr>
<td>Marion Boeheim, HR</td>
<td>Business Continuity</td>
</tr>
<tr>
<td>John Carter, network administrator, San Bernardino County</td>
<td>Business Continuity</td>
</tr>
<tr>
<td>Kevin Crowley, course management system administrator</td>
<td>Application Performance</td>
</tr>
<tr>
<td>Babette Dershem, instructional media specialist</td>
<td>Infrastructure - Instructional Technologies</td>
</tr>
<tr>
<td>Faculty users of WebAdvisor and Blackboard</td>
<td>Application Performance</td>
</tr>
<tr>
<td>Justin Gatewood, webmaster</td>
<td>Infrastructure - General and Web</td>
</tr>
<tr>
<td>Brian Hatchell, network manager</td>
<td>Application Performance</td>
</tr>
<tr>
<td>Jeffrey Holmes, director of Disabled Students Programs &amp; Services</td>
<td>Data Accessibility - ADA</td>
</tr>
<tr>
<td>Greta Moon, director of Admissions and Records</td>
<td>Business Continuity</td>
</tr>
<tr>
<td>Virginia Moran, executive dean of Institutional Effectiveness</td>
<td>Business Continuity</td>
</tr>
<tr>
<td>Mary Pringle, director of Fiscal Services</td>
<td>Application Performance</td>
</tr>
<tr>
<td>Robert Romberger, workstation tech</td>
<td>Business Continuity</td>
</tr>
<tr>
<td>Khalid Rubyai, Electronics professor</td>
<td>Technical Services - IT Services</td>
</tr>
<tr>
<td>Jerome Short, database administrator</td>
<td>Application Performance</td>
</tr>
<tr>
<td>Mike Smith, Education Technology professor</td>
<td>Infrastructure - Instructional Technologies</td>
</tr>
<tr>
<td>Shane Thomas, chair of CIS department</td>
<td>Technical Services - IT Services</td>
</tr>
<tr>
<td>Marianne Tortorici, VP of Instruction</td>
<td>Business Continuity</td>
</tr>
</tbody>
</table>
3.0 Infrastructure

3.1 General

3.1.1 Current State

3.1.1.1 Design

Cisco Systems recommends that its customers, whenever possible, implement a hierarchical network model. This design distributes network functionality into three distinct layers:

- Core: Facilitates high speed switching
- Distribution: This layer is responsible for routing between networks
- Access Layer: Provides connectivity into the network for user devices

The VVC network does not conform to this model. VVC has not implemented a distinct Distribution Layer and, based upon the size of the network at this time, may not require one. Additionally, VVC has not implemented a core switch as previously defined. Currently, the VVC core switch is providing functionality associated with the Distribution Layer. It is also providing the functionality of the Access Layer by allowing connectivity to end user devices. Ideally, it should only be providing functionality associated with the network core.

Based on the current size of the VVC network, PlanNet Consulting does not feel that this recommendation is a high priority. However, as the VVC network expands, the network architecture should migrate towards this type of design.

Physical Redundancy

Although the stated desire is to provide a network that is always available (24 hrs x 7 days is an informal service level objective), there are gaps in the physical and logical components of the network that could prevent this from occurring. This service level requires complete redundancy in the network infrastructure; there cannot be any single points of failure.

When a network is reviewed for physical redundancy a number of areas are addressed:

- Does the cable plant provide more than one connection to the network core from each IDF?
- Do the network electronics have redundant power supplies, supervisor modules, or even completely redundant switches in critical areas of the network?

The answer to both of these questions in the case of the VVC network is “no.” Although the cable plant may allow for multiple connections to the network core, VVC does not utilize them uniformly across the campus. Each Access Layer switch utilizes a single Gigabit Ethernet uplink back to the core of the network. Between the old and new NOCs, a single 20 Gigabit link is created using EtherChannel.
Also, VVC has not implemented complete redundancy in its network electronics. Although the Catalyst 6500, which serves as the network core, has been implemented with redundant supervisor and power modules, it could still fail. PlanNet has experienced situations in which a corrupt software image has removed a switch from service. There is the possibility the core switch could suffer a catastrophic hardware or software failure. In that scenario the entire VVC network, including voice, data and video would be out of service.

**Logical Redundancy**

Logical redundancy is facilitated by Layer 3 protocols, such as OSPF or EIGRP. It is the function of these protocols to detect failures within the network and re-route traffic around failures, both physical and logical.

VVC’s sub-networks are directly connected to a single core switch. Therefore, traffic can pass between these networks without implementing a routing protocol. However, this is not providing for logical redundancy because it does not have the hardware and software that is required.

3.1.1.2. Documentation

At this time there is limited documentation available.

**Policies and Procedures**

Currently, there are no agreed upon and documented policies and procedures for:

- Network downtime for preventative maintenance or upgrades
- Testing and accepting new versions of IOS prior to implementation
- Network upgrades such as a bandwidth increase or port capacity
- Software features implemented on network components
- Equipment standards
- Security (network, information, etc.)

**Network Diagrams**

PlanNet was provided a logical network diagram; however, it did not reflect the current state of the network. In fact, little documentation of the network exists. What does exist results from labor-intensive, reverse engineering efforts. This is a very inefficient and reactive method to maintain documentation.

Similarly, there is no process to keep network documentation current.
3.1.1.3. Equipment

VVC has standardized on equipment from Cisco Systems which provides connectivity at speeds between 10Mbps up to 10Gigabits per second. On the VVC campus, connection speeds of 10 or 100Mbps are used for end stations, and 1Gbps to 10Gbps connections are used as uplinks to the core switch. VVC has implemented a 20Gbps connection between the old and new NOCs.

VVC is at risk due to the fact that Cisco has placed a number of the currently installed network devices within the network infrastructure on their end-of-life / end-of-support list. This includes 100 Access Layer switches and the wireless LAN controller. The implication to VVC is that these devices can no longer be purchased new, and after a specified date, Cisco will no longer support them. Below is a list of the impacted devices:

<table>
<thead>
<tr>
<th>Network Component</th>
<th>End-of-Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catalyst 2950G</td>
<td>2011</td>
</tr>
<tr>
<td>Catalyst 3508</td>
<td>2008</td>
</tr>
<tr>
<td>Catalyst 3524xl</td>
<td>2008</td>
</tr>
<tr>
<td>Catalyst 3548</td>
<td>2007</td>
</tr>
<tr>
<td>Catalyst 3550</td>
<td>2011</td>
</tr>
<tr>
<td>WLSE (wireless LAN controller)</td>
<td>2009</td>
</tr>
</tbody>
</table>

The VVC networking staff is following a “fly into the ground” strategy for replacement of these devices. Their plan is to continue to use these devices until they fail and at that time replace them. Currently, there is no budget allocated or a plan to replace these devices.

VVC also has 68 access points (APs) deployed to support their wireless network which are all “autonomous” APs. These APs are managed centrally by Cisco’s Wireless LAN Solution Engine (WLSE) which will soon reach “end-of-support” as indicated above.

On the server side, there is not currently any warranty management. The standard is that production systems are placed on servers that have three year replacement plans. However, when those plans expire, there is not a system to migrate applications on those servers to new equipment.

3.1.1.4. Maintenance

VVC has contracted with Cisco for SmartNet maintenance for specific networking components, such as their core Catalyst 6500 switch. This maintenance contract provides 4 hour on-site response for all devices covered by this contract. This contract does not include the access layer switches which are on Cisco’s end-of-life list.

3.1.1.5. Network Management

**Monitoring**

The network staff utilizes NetCrunch to monitor its servers and network components.

**Network Utilization**
During the data collection phase of this project, PlanNet requested that the VVC IT staff provide network utilization reports. According to the IT staff, the version of NetCrunch currently in use does not have this capability. Without this capability, the VVC networking staff has no way to forecast the need for future network upgrades. It is PlanNet's understanding that the current version, NetCrunch 5, can provide this capability.

3.1.2 Recommendations

3.1.2.1. Redundancy

PlanNet recommends that VVC implement a redundant network Core comprised of two (2) Catalyst 6509s. In this design, all users that currently connect to the network core would be relocated to Access Layer switches. This redesign would provide physical and logical redundancy to the VVC network. The estimated cost for this modification would be approximately $403,095 (see Appendix 1 for details).

3.1.2.2. Equipment

Currently, there is not a plan or budget to replace the equipment that has reached end-of-life status. PlanNet recommends that a budget be created and a plan implemented to replace these devices. VVC would achieve the lowest price points by purchasing all of these devices at one time. The cost of professional services should be included in this budget to assist with the replacement of these devices. PlanNet also recommends that VVC purchase and store two or three additional Access Layer switches as hot spares. The spares would replace the need for a maintenance contract on these devices. The estimated cost for this equipment is approximately $1,810,725 (see Appendix 2 for details). This estimate assumes a worst case scenario for budgeting purposes (all switches contain 48 ports, each port is capable of 10/100/1000 Ethernet, and all ports provide PoE).

VVC should also develop a plan and a budget to either upgrade their existing APs to “thin” technology or replace the APs with current 802.11n APs. In either scenario, VVC would also be required to replace the wireless LAN controller which is on the end-of-life list. PlanNet also recommends that VVC install two controllers for redundancy. The estimated cost to upgrade the wireless network is approximately $189,074 (see Appendix 3) for details.

3.1.2.3. Network Management

PlanNet recommends that VVC investigate the upgrade costs and additional features offered by NetCrunch 5. If this cost is in excess of $20,990 (approximate cost for CiscoWorks, see Appendix 4 for details), PlanNet recommends a thorough evaluation of available network management products be undertaken.
3.1.2.4. Documentation

As stated earlier, VVC currently has little or no agreed upon and documented policies and procedures. Areas that need to be documented to conform to best practices are:

- Negotiate with the user community on an agreed upon network maintenance schedule that will allow the IT staff to maintain and upgrade the network on a regular schedule. This will allow the user community to plan and schedule around these published outage windows.
- Establish procedures for testing and approving new versions of IOS
- Establish policies and workflow documentation for the user community to request new network services or upgrades
- Establish standards for software features support on network electronics
- Although VVC has already established Cisco as their vendor of choice, standards should also be set for types of equipment deployed at each networking layer. This will make network maintenance more efficient, as well as aid in the budgeting process.
- Create network service level agreements

PlanNet also recommends thoroughly documenting the current network, including the relationships of all key components. Further, VVC should develop a process to keep the created documents up-to-date.

3.2 Web Strategy

3.2.1 Current-State

Currently, there are no application context diagrams (describing how applications across the enterprise interact with each other) or specific application to network diagrams (diagrams representing an application’s physical components and their connections to core infrastructure). There is a network diagram that shows the overall architecture of the current build-out; however, it is not up to date.

The support requirements as stated by the IT staff are 24x7. However, there are no service level agreements (SLAs) or operating level agreements (OLAs) in place for support of business-facing web applications. Support is either managed from an external vendor or on a best-effort basis from the IT support team.

Likewise, there is a single point of failure in the CENIC router that is outside of the staff’s control. If that router fails, all inbound access to the web servers will be lost until the vendor replaces or fixes the device.
3.2.2 Recommendations

PlanNet recommends establishing service level agreements for web applications and hardware. VVC should also implement a documentation strategy that includes the following requirements for all web applications that are to be supported by IT:

- Application context diagrams showing interdependencies with other applications

- Network / physical diagrams that are presented from each application’s perspective showing physical servers and connections to core equipment, including SANs and network gear

- Third party supported applications should also produce this same documentation if it touches core infrastructure

We also recommend that VVC solicit a secondary Internet circuit to serve as a backup to CENIC.

3.3 Instructional Technologies

3.3.1 Current-State

3.3.1.1 Organizational Structure and Budget Allocation

Discussions with multiple faculty members have indicated an extremely high rate of turnover for administrative and management positions throughout the college. Described to be almost entirely related to the turnover issue, management at the institutional level has not successfully conveyed an interest in substantive improvements to the current state of instructional technologies. Whether a fact or simply perception, these issues must be addressed in order to encourage staff to take ownership in the successful development and implementation of any recommendations set forth in this report.

Instructional technology resources are assigned to the IT department. Commonality of procedures and staff skill sets make this a common organizational strategy. An unfortunate result of this model is the allocation of support personnel and budgets required for assisting instructional faculty are not aligned with instructional goals.

In addition to the budget allocations for instructional technology within the IT department, individual departments are provided non-trivial budgets used to procure projectors and other equipment. These purchases are made with no (or minimal) enforceable controls in place to ensure purchased products are justified, compatible to needs, or standardized. Such purchases result in equipment that does not meet minimum feature requirements, inaccurate inventories, longer repair evolutions when compatible spares are not available, increased consumable inventories, and ignore long-term plans in favor of satiating a short term need.

3.3.1.2 Manpower and Skill Set

The Instructional Technologies group is understaffed. Current staffing dedicated to instructional technology consists of two individuals – an instructional media services (IMS) coordinator and an instructional media services aide – servicing approximately 120 discreet audiovisual systems of varying complexity and
serviceability. A third job description for an instructional media services technician was provided for review, though there are no active recruiting efforts under way. This third position is not currently funded.

The majority of the coordinator’s time is required to perform service calls, maintenance tasks and provide setup assistance to end users. The current job description for this position lists these tasks as subordinate to numerous administrative tasks including inventories, budget administration, purchasing and training.

Greater than half (20 – 35 hours / week) of the aide’s time is required to support the ITV / distance learning room. Support of this room is specifically listed as a single line item in the current job description. The time expended by the IMS aide in support of the ITV room has a direct impact to the IMS coordinator’s ability to attend to primary job responsibilities. PlanNet believes the fulfillment of the open IMS technician position would have a profound positive impact on the ability of existing staff to facilitate improvement efforts.

Standards for analogous job descriptions have not been defined by the California Community Colleges Chancellor’s Office. The existing job descriptions are typical for instructional technologies support staff. All job descriptions should be updated to include audiovisual industry certifications.

The chancellor’s office provides staffing benchmarks for a multimedia production specialist to support faculty with multimedia production, delivery, and operations. At a minimum, this is a half-time position with indication for one position per 200 faculty. Additional positions defined by the chancellor’s office that may provide some overlap or cross-functionality are discussed in the Technical Services Staffing section.

Training for both the support staff and the end-users of the instructional technologies is also an issue. No concerted training program is in place for either. Previously established staff training programs are either in disuse or have not kept up with technology advancements and expanded requirements. Faculty are not obligated to participate in instructional technology training.

Instructional technologies support staff are not members of industry associations that would assist with their on-going training. Membership to standardization bodies, such as BICSI and InfoComm, provide relevant resources for industry news, standard practices and community forums.

3.3.1.3. Process and Standards

Documentation of processes and standards specific to instructional technologies is limited. Discussions with staff revealed many gaps due to outdated or non-existent documentation. Other processes, such as purchasing are not followed due to complacency and alternative methods of procurement that bypass necessary controls, as previously mentioned.

3.3.1.4. Hardware

The existing ITV / distance learning room is located in a trailer on the lower campus. The long-term availability of this location is in question. To our current understanding, a stipulation for funding of a recent improvement project may require use of the trailers to be discontinued.
Interest in using ITV for off campus class delivery has increased. This system is currently used daily by the college. Cal State San Bernadino has use of the room daily after 4:00pm. The equipment in this room is approximately seven to eight years old. Recent equipment failures have caused disruption to scheduled classes.

Recent upgrade projects have provided the campus with new projectors and other equipment for approximately 15 rooms distributed campus-wide. In addition to these individual rooms, newly-constructed rooms in the “new technology” building are representative of modern, easy-to-use smart classrooms.

For the new technology building project, the audiovisual systems integrator was contracted directly to the college. Construction administration tasks typically assigned to the general contractor or a third-party consultant were not fully addressed, resulting in coordination challenges and ambiguous contractor responsibility assignments. Other factors may have contributed. As a result, several outstanding issues remain, including projectors that are installed too high, tablet displays that must be propped up on boxes, and data jacks intended for the lecterns that are not properly located.

Observation of several legacy smart classrooms revealed systems in an advanced state of disrepair. Each of the rooms observed of this type were almost completely unique with respect to equipment model numbers, methods of integration and operation. Projectors are not properly secured to their mounts, are not aligned to screens and are substantially underpowered for the application. Audio systems include 20+ year old home FM tuner / stereos as well as various other configurations. Systems are controlled either by buttons on the device or myriad handheld remotes.

The remainder of campus classrooms are serviced by mobile carts (approximately 45 carts are in active service) having various configurations of a projector, DVD / VCR player, powered speakers and a PC. Many of these mobile systems are semi-permanently assigned to a room and only moved to accommodate faculty changes. Excepting recent efforts to upgrade the PCs, all of the observed carts are in a similar, substandard condition to the legacy smart classroom systems.

3.3.1.5. Distance Learning

The Distance Education Sub-Unit of the chancellor’s office provides detailed regulations and guidelines regarding distance education. Available VVC documentation indicates the college adopted these guidelines during previous distance education development and expansion efforts. However, interviews reveal a 50% decline in available course sections from a high point near 500 offerings. The decline is attributed to minimal or no strategic support for including distance education into instructional goals.

3.3.1.6. Streaming Media

Current methods for production of streaming media content for use in distance education rely on personal staff initiative using makeshift systems, including webcams or recordings to video tape that are subsequently captured to a PC.

3.3.2 Recommendations

3.3.2.1. Organizational Structure and Budget Allocation
• Recognition of instructional technologies as an institutional priority must be communicated to faculty via allocation of personnel and financial resources. All levels of management must portray an active interest in improving the current state of instructional technologies.

• In line with the restructuring recommendations described in the Technical Service Staffing section, the dean of Instruction shall provide active oversight of all instructional technology initiatives. This resource will direct efforts as described herein to develop strategic and organized approaches to the use of instructional technologies.

![Diagram of organizational structure](image)

**Figure 1**

• Centralize instructional technology budgets. All purchases must be approved by a qualified technical resource responsible for ensuring adherence to procedures and standards specific to instructional technologies. This is a significant issue shared with other areas of this report. Refer to the IT Services section for additional recommendations.

• Re-evaluate available budgets to prioritize instructional technology needs for support staff, maintenance and upgrades

3.3.2.2. Manpower and Skill Set

• Immediate placement of a qualified resource to the IMS technician position is required (see Figure 1) in order to facilitate maintenance of existing systems and free-up time for existing staff to implement the recommendations herein. This position could be a temp-to-perm opportunity. Once systems are upgraded and procedures are established the need for this position may be reevaluated.

• The addition of a multimedia production specialist is required (see Figure 1) to refresh existing online content and will play a pivotal role in advancing current capabilities for future needs. This position may provide a dual-role by assisting faculty with effective integration of technology into instruction.
• Professional development standards unique to the instructional technologies department must be established for the support staff. Industry certifications and memberships to standardization bodies must be included in training standards and all job descriptions for future hires.

• Development and performance of basic to advanced training sessions unique to campus systems for instructional staff is well within the capabilities of current support staff. Management must enforce training program participation of the faculty and ensure support staff are afforded time to develop / update materials. Distance learning and self-paced sessions provided by third party or college resources should be included as part of formalized learning plans.

• Enforce utilization of a work order tracking system to accurately track manpower requirements, maintenance evolutions, and trends analysis

3.3.2.3. Process and Standards

• Conduct a detailed review of any existing instructional technologies policies, processes, standards, service level agreements (SLAs), standard operating procedures, etc. The first pass should be to eliminate topics deemed irrelevant based on current technologies and business structure. Refresh remaining documents accordingly.

At a minimum, document the following:

  o Purchasing procedures
  o Integration / equipment standards for all room types
  o SLAs for repairs and support calls
  o Equipment life-cycle / end-of-life tracking and scheduled upgrades
  o Training requirements for all faculty and support staff

• Use construction documentation from the “new technology” building, including equipment lists, drawings and specifications, to develop standards for each type of technology room. Smart classrooms, distance learning rooms, conference rooms, auditoriums / lecture halls should all be based on the same equipment and installation techniques. An audiovisual consultant should be engaged for this effort.

• Distribute relevant documents to all departments and enforce adherence
3.3.2.4. Hardware

- Using existing inventory documentation, identify all rooms in need of upgrade. Break the rooms into phases based on current system status, room usage and available budget. Smart classrooms, based on the rooms in the new technology building, cost approximately $21,000 to $29,000.

- Phased upgrades to all legacy systems should be planned immediately following development of standards documentation as described above.

- An audiovisual consultant should be engaged for each phase to survey rooms, verify applicability of standards to each space and document any necessary deviations.

- Construction administration and coordination responsibilities for all future audiovisual integration projects must be coordinated so that instructional technology is properly represented. This responsibility should be carried by the general contractor or an audiovisual consultant.

- Staff should be discouraged from performing integration tasks. Such work is outside of current skills. Warranties for product and installations should be procured and administered.

3.3.2.5. Distance Learning

Considering the cost-saving potential of distance education, a renewed focus toward expansion of offerings is in order. This will require improved content creation capabilities, (discussed in the next section) an evaluation of courses suitable for the application, and appropriate staff and faculty training specific to distance education methodologies.

Additionally, and as previously described, a modernized ITV / distance learning room will greatly improve the quality of live distance education capabilities while significantly reducing the need for dedicated support staff. An updated distance learning room is estimated to cost $65,000 to $100,000. This includes HD videoconferencing, dual audience monitors, presenter confidence monitor(s), two cameras, control system, and auxiliary audio / video inputs.

3.3.2.6. Streaming Media

A properly engineered recording studio reserved primarily for distance education content creation will ensure high quality audiovisual presentations and a level of consistency throughout all available course material. A very modest system with basic functionality utilizing professional grade components would be sufficient for this purpose. Minimum components would include a camera, lapel microphone, audio mixer board, appropriate lighting, and an interface for the instructor’s computer so it may be displayed in place of the camera image. Such a basic system (including camera, wireless microphones, audio mixing console, video capture PC with editing software, and auxiliary audio / video inputs) costs approximately $12,000 to $20,000. Technician support during setup would be recommended, but not necessarily required with appropriate training. More robust systems requiring additional back-end infrastructure can add capabilities such as simultaneous viewing of the instructor and the instructor’s computer, and chat features that encourage interactive participation during live sessions.
Akin to the distance education methodologies described above, podcasting is simply another avenue for streaming live or pre-recorded content. Mistakenly, podcasting is typically considered an audio-only medium associated with the use of iPods. In fact, podcasts can include video, may be viewed on a PC with free software, and do not require the use of any specific manufacturer’s product.

From a technological point of view, the primary difference between traditional media streaming and podcasts is the use of syndication feeds, allowing users to establish a subscription whereby updates are downloaded automatically. In application, the automatic feature of this communication method provides very interesting capabilities specific to educational institutions above and beyond traditional media streaming. Instructors can distribute daily homework assignments and record in-class lessons or lectures that students can review at their own pace. Administrators can deliver messages to faculty or general announcements to anyone subscribed to the appropriate feed.

While any computer with continuous network access can be used to host a podcast, a centralized, server-based system would be required to ensure proper security and to eliminate the requirement for instructors’ PCs to be left on for after-hours access. Assuming network infrastructure can accommodate bandwidth, at a minimum, this server would need to run RSS or ATOM syndication protocols. Custom or prepackaged Internet accessible web pages will need to be deployed to categorize links to individual feeds. Faculty will require training to create and publish desired content.

Case studies are available documenting educational podcasting systems assembled at very little cost. Considering current manpower resources and hardware availability, new hardware and commercial software with support services is a more reasonable prospect. Training of faculty, support personnel for content editing and system administration are additional costs. Price estimates:

- Server with applicable software: $5,000 - $8,000
- MP3 recording device w/ microphone (each): $500 - $1,500 (recording capabilities may be integrated into smart classroom systems for roughly the same cost per room)
- Audio editing software (each PC): $0 - $2,000
- Existing PCs with inexpensive microphones may be used for informal applications, such as daily homework assignments
4.0 ADA and Section 508 Compliance (Audiovisual)

ADA requirements primarily address physical access to facilities and services for disabled persons. Section 508 of the Rehabilitation Act specifically addresses accessibility to electronic and information technology (E&IT). The California Community Colleges Chancellor’s Office provides requirements for participation in the Disabled Students Program and Services program. Additional related documents include California State Assembly Bill AB 422, Steinberg and California Community Colleges Chancellor’s Office Legal Opinion M 02-22, among others.

This section is intended to provide an evaluation of observed business practices as they relate to audiovisual technologies and compliance with these regulations. A detailed evaluation / discussion of requirements mandated by either act and other applicable regulations is beyond the scope of this document.

Extensive resources, including white papers, executive overviews and reference guides are available via the following organizations:

www.ada.gov
www.section508.gov
www.accessibilityforum.org
www.cccco.edu

4.1 Current-State

The college does not have in place policy or procedure to address design, development, procurement or the use of E&IT for individuals with disabilities.

VVC does not provide or mandate training of faculty regarding liability issues or curriculum requirements to accommodate individuals with disabilities.

Availability of compliant alternatives for courses (classroom-based or online) and associated media is limited.

Distributed purchasing pathways described in the Instructional Technologies section of this report allow for procurement of equipment that is not compliant with section 508 guidelines.

Closed-captioning-capable projectors, compliant with Section 508, have been purchased for recent new construction and upgrades. Placement of cables and controls on lecterns procured for these projects appear to be compliant. However, integrated computer monitors cannot be viewed from a seated position or easily repositioned by the end user. Outside of the new rooms, none of the observed classroom systems or media carts would be considered compliant. Using the most basic of criteria, projectors do not support closed-captioning, nor are accessory encoders provided. A closer examination of accessibility to controls, connectors, etc. will certainly reveal additional discrepancies. Only one of the observed rooms (a computer lab in building 10A) had a desk specifically designed for accessibility. Unfortunately, this desk requires replacement of several missing bolts / parts.

4.2 Recommendations

• Management must provide clear and concise direction for development and adoption of compliance policies, supported by appropriate resources committed for training programs and modification of curriculum
• Incorporate ADA, Section 508 and DSPS compliance requirements for equipment specifications into the instructional technologies standards

• All purchases should be approved by a qualified technical resource responsible to ensure adherence to procedures and standards. Purchasing procedures for instructional software and media should mandate that vendors provide products compliant with applicable standards.

• VVC should gain access to tools that evaluate accessibility, such as Web Accessibility Toolbar, available from VisionAustralia (http://www.visionaustralia.org/info.aspx?page=614). The tool should be applied to the registration interface periodically to gauge effectiveness and compliance in this area. All local web development should be passed through this rubric before publishing to the site. Datatel already asserts that their interface is compliant and a statement to that effect is published on their website.

  VVC should also consider using a consulting service to perform these periodic reviews rather than build these competencies in house. Whether reviews are performed internally or jobbed out, IT should answer to the campus accessibility and compliance officer for these periodic reviews.

• Initiate training programs for faculty to improve teaching methodologies for persons with disabilities. The High Tech Center Training Unit of the California Community Colleges (www.htctu.fhda.edu) is a significant resource for establishing such a training program.

• Amendments / revisions to all applicable regulations are in various stages in their respective approval processes. A periodic review should be made of each entity’s requirements and adoption schedules.

• The chancellor’s office has established a schedule for adoption and approval of DSPS program plans as part of the student services program review process. According to available documentation, a program plan will be a requirement of accreditation.
5.0 Business Continuity

5.1 Current State

5.1.1 General Business Continuity and Plans

The assessment of the VVC environment confirmed that there is no formal business continuity program in existence, nor is there an individual held accountable for such a program. There are no documented business continuity plans in place to recover critical business processes, nor are there any documented disaster plans to aid in the recovery of the technical infrastructure. The primary means of emergency communications are limited to the use of cell phones, and critical workflows are not documented.

San Bernardino County (SBC) manages two key systems for VVC. These are the payroll system, as part of Human Resources, and the fiscal systems, and they do have some limited backup capability. The systems run on an end-of-life HP 3000 computer at the SBC data center which is backed up by another HP 3000 at VVC. Each computer has several hours of uninterruptible power supply (UPS) capability, but each system is close to the end of its useful life.

Specific gaps associated with general business continuity include the following:

- No chief risk officer. There currently is no chief risk officer at VVC. An open position does exist but the job description needs to be revised to ensure the position provides centralized responsibility and accountability for all aspects of business continuity.

- No formal business continuity program exists. As a result, various aspects of such a program are also non-existent. For example, business processes at VVC have not been prioritized as to operational and financial impact in the event of a sustained interruption, nor have the input and output dependencies of these processes been identified. Recovery time objectives (RTOs) and recovery point objectives (RPOs) have not been determined for these processes.

There has been no recent risk assessment conducted or recovery strategies evaluated and selected. Plans for the business recovery of processes and the technical recovery of the IT infrastructure and applications do not exist. These various activities are all associated with a formal business continuity program.

- No emergency communications system. Other than the use of cell phones, there is no all-encompassing emergency communications plan to notify all necessary and appropriate parties of an event of major impact.

- No workflow documentation available. The ability to restore critical processes, such as registration and admissions, at a recovery site in the event of a disaster is greatly impeded by the lack of clear, accurate workflow documentation.
5.1.2 Hardware

Gaps were identified with the redundancy and capacity of hardware that support backup and recovery activities, and there are no service level agreements in place to specify recovery requirements. The lack of sufficient hardware includes both tape and disk devices as noted below.

- There are no documented service level agreements (SLAs) currently in place, and consequently no RTOs or RPOs to help determine recovery requirements.

- No redundant storage area network (SAN). There currently is only one storage area network device available for storing all critical data online. This is an exposure in the event of a major outage to this device.

- No redundant tape drive. There is only one tape drive currently in use to provide tape backups. This is a single point of failure and can be remedied for relatively little cost.

- No archival storage hardware. There are no means to archive data on to a disk storage device. Such a device would facilitate an efficient data retention program and enable more efficient storage of infrequently used data.

- Backup tapes are stored only onsite rather than offsite. Attempts to acquire offsite tape storage services have not been successful. Two vendors were contacted but neither was willing to follow-up with required services.

5.1.3 Software

- No means to backup files while online. Between 20% and 30% of the 2,400 desktops are often left signed on with files open long after the users have left for home. This leaves dozens of critical files open during off-hours when backups are being conducted. There currently are no means to backup these critical data files during times that the files are left open. This limitation reduces the frequency and thoroughness of backups, and may eventually cause scheduling conflicts as backup windows shrink while data and backup times expand.

5.1.4 Backup and Restore Methods

- No capacity planning performed. There is no formal, or informal, capacity management process in place. The expected increased demand for IT services and resources, particularly disk storage, network bandwidth and server capacity, puts the IT infrastructure at VVC at risk of not being able to predict or cost-effectively meet future capacity requirements.

- No data retention policy. All data at VVC is kept indefinitely. A proposed backup policy has been under review for almost a year, appears far from being approved, and does not address data retention. There is no formal policy on when or how to retain, archive or destroy data. The lack of such a policy will eventually lead to expensive and unmanageable amounts of data to store and backup.

- Data not being archived. Data that needs to be retained but not used frequently is not being archived. This takes up expensive primary disk storage space, and adds to the challenge of managing ever-increasing amounts of data.
5.1.5 Fault-Tolerance and High-Availability

- There are no current service level agreements in place that describe the availability requirements for critical applications.

- Clustering is not extended to all applications. Clustering of servers does exist for a few critical applications, providing some provision of fault-tolerance and high-availability in the event of server failures. Several other critical applications are not incorporated in this clustering scheme.

5.2 Recommendations

5.2.1 General Business Continuity and Plans

- Hire a chief risk officer who will be responsible for all aspects of a comprehensive business continuity program. Ensure that the job description includes duties and descriptions about overseeing the conducting of risk assessments and of developing and testing business and technical recovery plans. This position should report to the chancellor. Efforts to recruit this individual should be intensified, possibly employing the services of a search firm.

- Establish a formal business continuity program under the direction of the chief risk officer. The program should include basic aspects of business continuity including a business impact analysis, risk assessment, recovery strategy evaluations and selection, and the development, implementation, testing, and updating of business and technical recovery plans.

- Evaluate, select and implement an emergency communications plan to effectively notify first responders, staff, faculty, students and suppliers of any event resulting in a sustained outage to one or more critical business processes. Such a system could also be planned and used in conjunction with any systems used in response to events involving threats or occurrences of physical violence.

- Develop thorough and current workflow documentation for all critical processes.

5.2.2 Hardware

Service level agreements (SLAs) should be negotiated to confirm recoverability requirements. If such requirements are confirmed, a minimum of three pieces of hardware should be procured to improve the recoverability of critical processes and the effectiveness of business continuity plans. One is a secondary tape drive that should be added to the existing tape library systems to reduce the time required for data backups and to provide redundancy of hardware. The other two involve storage area network (SAN) devices to provide redundancy and much-needed archival storage capability.

- Establish SLAs to determine availability requirements and confirm that immediate recovery of applications on the storage area network (SAN) device is warranted.

- A verbal requirement of immediate recoverability of the existing SAN was issued by VVC executives last year. As a result, a high speed fiber network was installed between two buildings on campus almost one-mile apart. If this requirement is still valid, then an additional storage area network device should be procured to provide redundancy to the current single piece of disk hardware.
that provides the backing up of critical data. This is estimated to cost between $50,000 and $60,000.

- Procure an additional tape drive to provide redundancy and faster transfer times to the current method of using a single tape drive to backup critical data. This is estimated to cost between $9,000 and $12,000.

- Procure an additional storage area network device to provide for the archiving of infrequently used data. This will free up space on the primary SAN system and will support a more efficient data retention program. The current Compellant SAN can support three-tier archival storage in a very easy manner. An additional chassis and drives is estimated to cost between $50,000 and $60,000. An alternative to this would be to negotiate backup SAN services with SBC.

- Re-visit attempts to secure off-site storage services with vendors such as Iron Mountain. If such services are not available, consider an agreement with SBC.

5.2.3 Software

The single piece of software required to improve the recoverability of critical processes and the effectiveness of business continuity plans would be a product that allows the backing up of critical data while the files are still open and being used. Other software is available on the market that is specifically designed to develop business continuity and technical recovery plans, but the expense of such software does not warrant it being recommended at this time. As the VVC business continuity program grows and matures, such software should be re-visited and considered.

- Procure a software product that would enable critical files to be backed while they are still up and running, or in the event the files were inadvertently left open, which appears to happen often. An additional benefit of such a product is that systems that require these files would not have to be taken down in order for backups to be performed. Such software would cost between $12,000 and $15,000.
5.2.4 Backup and Restore Methods

Nightly incremental backups and weekly full backups are being performed, but several suggestions are offered for improving the overall process. Backup and restore methods could be improved by instituting a number of organizational and policy changes. Among these are the implementation of a data retention policy and an archival system of backups. Data retention policies would prescribe criteria by which data is owned, retained, archived and deleted. This would result in less data needing to be fully backed up and stored outside of the data center. An archival system would help facilitate this methodology. The addition of the additional tape drive recommended previously would also improve backups and restores.

- Establish a formal capacity management process for VVC to anticipate and meet future resource requirements, especially disk storage, in an efficient and cost-effective manner
- Establish a formal data retention policy that applies to all departments, all owners of all data, and includes backup and restore policies
- Implement a data archival process that enables frequently used data to be accessed rapidly and efficiently, and less used data to be archived separately

5.2.5 Fault-Tolerance and High-Availability

VVC employs few aspects of fault-tolerant systems and high-availability applications, and no SLAs exist that describe high-availability requirements. One exception to this is the clustering of servers that provides a resulting configuration of active-active high-availability for a limited number of applications.

- Negotiate availability requirements for critical applications and include these agreed-upon requirements in SLAs
- Based on SLAs, include appropriate critical applications in the server clustering scheme to extend the use of fault-tolerance and high-availability. For example, the Student Information System (SIS) currently is not clustered due in part to its database design (UNIDATA) and its application design. The operating system for SIS is HP Unix, which can be clustered.
- An alternative, more cost-effective recommendation is to setup sub-Production environments for critical applications. These sub-Production environments could be transitioned to Production if the current Production environment goes down.
6.0 Technical Services Department

6.1 Staffing

In almost every aspect, the Technical Services division is understaffed, lacks adequate training, and shows signs of being demoralized. Resources are stretched thin with little capacity or incentive for professional development. Formal skills in the service areas are generally lacking. There is no routine evaluation process that would allow staff members to give and to get feedback about job performance and goal setting for upcoming evaluation periods. There is little emphasis on certifications and there is no formal process for providing professional development and ongoing training to technicians.

The lack of a functioning help desk contributes to disorganization and limits the possibility of effective resource planning, status reporting, and customer feedback.

VVC is critically without technology leadership. Three director-level or higher positions are vacant and all are being back-filled by the same individual. Indications are that vacancies for replacement positions at all staffing levels take too long to recruit and fill and even longer for newly funded positions.

6.1.1 Current State

6.1.1.1 Desktop Support

VVC currently has three positions for handling desktop support, with one of those positions vacant. There are approximately 560 staff and faculty workstations and 1400 lab and academic workstations. Service and repair requests are supposed to be submitted via the on-line OPRA ticketing system, but staff interviews indicate that a significant percentage of requests, perhaps as high as 20% in the desktop support area, do not make their way into the tracking system.

Analysis of the workload from the ticketing system through the first quarter of 2008 shows that techs are severely backlogged and cannot close out tickets as quickly as they are coming in. Average days to close is around 16 with open tickets standing at 37%. Ideally, technicians would close out Level 1 requests in hours rather than days and would carry a minor backlog associated with project-based work rather than conventional service orders. The lack of established service level agreements for desktop support results in a best-effort approach rather than the application of necessary resource loading to accommodate current conditions.

Login and password problems rank among the highest quantity of work orders. Some of this could be mitigated by better procedures at hiring time to insist that passwords are changed during orientation rather than letting grace periods expire.

The state chancellor’s office (CO) guidelines for FTE in support of desktop service and repair is one per 100 admin workstations to be supplemented by lesser grade tech support in labs and classrooms at one per 75 workstations. With 560 individual desktops and 1,400 academic lab workstations, the guideline calls for at least five admin techs and 19 lab support personnel, though the lab support number may be high to accommodate individual labs over a clustered or concentrated lab environment such as exists in VVC’s new Advanced Technology Building. Clearly the district is understaffed on the admin side of the equation from the standpoint of this benchmark, and the outcome of being understaffed has several implications. First, technicians are demoralized and constantly feeling that they are digging out.
Second, there isn’t available time for supplemental learning to occur that would keep technician skills sharp and beneficial to the demands of the job. Third, productivity for end users suffers as they are unable to fully utilize their desktop systems to perform their job duties.

Lab support is mostly decentralized with only eight of the 26 campus instructional assistants (IAs) reporting to a central manager. Some of the IAs are certified staff while most are classified. They are not always assigned or dedicated to specific labs / classrooms and are generally underutilized. The director of instructional assistants does not report within the Technical Services division.

System and application purchases, which are typically capital expenses, need to have their operational components quantified, not only from the perspective of licensing and maintenance, but also from the standpoint of internal support costs on a human resource level. A recent example is the addition of two new buildings equipped with a net increase of hundreds of new computers that did not also come with a staff allocation to address the increased support.

6.1.1.2. Network / Telecom

Network support is currently being handled by three staff members known as network managers. One of those is functioning as lead manager, and one has just recently transferred into the group from the desktop support team. Two telecom technicians are handling support of the VVC Cisco Call Manager system.

The chancellor’s office guidelines call for one network engineer / technician per 3000 FTEs, which places the recommendation at four staff positions. The guidelines specify that telephony systems are also to be supported from this classification and since cabling infrastructure is also supported out of this group at VVC, the current staffing level of five, including the two telecom techs, is appropriate.

Telecom support is currently handled by two staff members, one a lead coordinator and one a technician. The number of tickets the telecom techs perform each week is unclear because many of the work orders are delivered verbally and not subsequently entered into the system. And the fact that no tickets have been closed out since the beginning of the year suggests that OPRA is not being effectively used to measure capacity and productivity for this group.

The critical skill set lacking is formal Cisco Call Manager training for the telecom specialists. Individual efforts to gain network training have been made by the specialists and outside coursework conducted, but no college-sponsored effort or certification requirements put in place.

Server administration is being handled out of the network group, even though the CO staffing guidelines place this function within the desktop support category.

6.1.1.3. Web Support

Web support is not unified with content delivered via multiple servers and managed in multiple jurisdictions. There is no central governing authority to dictate unified look and feel and determine suitability of content. The webmaster has attempted to reach out to the various constituencies maintaining a VVC web presence and present guidelines and assistance in accomplishing some sense of uniformity and standards. The webmaster is knowledgeable in his domain area and effectively
delivering enhancements to the existing web presence. A content management system is needed to decentralize the task of publishing web content and training on such a system would become a job prerequisite.

6.1.1.4. MIS / LMS

The MIS group is currently structured with two analysts, one programmer, two DBAs also performing sys admin functions and a learning management system (LMS) specialist for Blackboard. The largest system supported by MIS is Datatel and a consultant is augmenting Datatel support functions while also tasked with supporting a data warehouse.

Because there is no tracking or resource utilization records available, information about the productivity and capability of the MIS group is anecdotal and by way of reputation. The information suggests that the group is completely saturated with maintenance and data remediation activities with no capacity for project-based work. Administrative departments have expressed little confidence in the ability to extend existing systems or embark on an ERP implementation when MIS is not able to keep up with day-to-day duties. A heavy emphasis on ad hoc report production would suggest that augmenting and rebalancing the staff allocation toward programmers who are able to do report-writing rather than analysts who would gather and articulate the requirements, may help alleviate a bottleneck at the production side of the equation.

There is a grave misalignment of job duties and skill sets within the MIS department. Staff members hired to perform certain functions have found themselves in the position of picking up other responsibilities to account for deficiencies in other areas. One of the DBAs hired to support the data warehouse supports the Datatel server instead, even though there is already a DBA to fulfill that function. The consultant hired to split time between support of the data warehouse system and support of Datatel has instead been almost fully allocated to Datatel. The result of this is that the ongoing maintenance and development of the data warehouse is suffering neglect. Analysts perform programming duties and report-writing tasks to augment the workload landing on the programming desk since there is only one programmer unable to keep up.

Data cleanup is also demanding time of the MIS staff due to issues in migrating to Release 18 of Datatel. With remediation and report-writing duties taking all the available staff resource allocation, there is no capacity for the MIS group to take on other projects or initiatives, such as extending Datatel into other aspects of a functional ERP, such as HR and Financials.

Specific training in Datatel best practice, such as Envision programming and system administration functions, is lacking in the MIS group. End-user training for report-writing, such as with Query Builder, is generally unavailable. Some end-user training on the data warehouse reporting utility has been formalized but not widely adopted.

The situation is not much different for LMS / Blackboard support. Currently a department of one, an additional staff position has been approved but not yet posted. The current LMS specialist is performing mostly system administration functions and some ad hoc end-user training. A survey of faculty shows that a considerable gap exists in the amount of training that is needed to support Blackboard and other aspects of instructional technology.
Another important finding in the area of instructional technology is that there is no mandate for faculty to leverage a single system for delivery of electronic curriculum. Some departments maintain instances of Moodle, an open-source equivalent to Blackboard, and some faculty are merely using Blackboard as a gateway to other content management platforms. This presents a challenge in training faculty for consistency and also permits a highly fractured end-user experience for students who will have no guarantee of a consistent interface as they move from class to class throughout their VVC coursework.

6.1.2 Recommendations

In addition to the various staffing level recommendations made below, it is essential and a key recommendation that VVC implement a routine employee evaluation process that would allow staff members to give and to get feedback about job performance and goal setting for upcoming evaluation periods. It is a characteristic of a healthy organization to nurture its own by investing in staff development, recognizing exemplary work product and challenging status quo.

6.1.2.1. Desktop Support

Level Two technicians are not currently required to have certifications or specialized training. Qualified comparable work experience is accepted. But there are some specific training and certification opportunities that should be explored in the area of desktop support, particularly in the area of Novell ZenWorks application support for deployment and imaging. Basic CompTIA A+ certification is advisable for dealing with hardware issues, as well as Microsoft MSDST for Windows support issues.

The desktop support group should also maintain Apple Macintosh support expertise and seek to have representative certifications for Mac OS.

We would recommend adding Tier 3 technical support within the desktop support group. We also recommend the addition of a hands-on manager to both oversee and augment the technical support staff. The director over computer lab support (IAs) should be brought into the Technical Services division, downgraded to manager level and should report to the director of Technical Services with dotted line to the manager of desktop support. IAs should be organized as adjuncts to the help desk, particularly after hours, since they already represent available resource hours that can be re-tasked more efficiently. Student workers should also be utilized within the desktop support organization to help with certain tasks, such as new system deployments, printer repairs, and other tasks that do not require specific specialization or application knowledge.

6.1.2.2. Network / Telecom

The current skill sets represented in the network management group appear to be effective in addressing support and architecture. The lead network manager is experienced in Novell network environments and competent in managing the Cisco hardware infrastructure.

The state chancellor’s office guidelines do not take into account after hours support, which is increasingly essential in this age of ultra connectivity and high expectations for around-the-clock access to information. Since VVC does not operate a conventional help desk to offer after hours support, it is recommended that two permanent staff positions be set aside to handle help desk support, one as a lead and one as technical support. These should function as a swing shift that covers
afternoon and evening hours, closing out tickets for the business day and picking up oversight and augmentation of duties performed by IAs after hours. Network technicians should rotate a staff person to be on call during these extended hours to respond and dispatch to service issues that relate to network or server outage.

Given the current structure and skill sets, we do not recommend that server administration shift away from the network support group, rather that the staff allocation required to support servers should be shifted to the network group. We place that allocation at 1 FTE.

The chancellor’s office guidelines for this service area make no distinction between support for modern IP telephony systems and legacy PBXes, which require moves / adds / changes (MAC) work to be performed by a technician knowledgeable in the techniques of cross-connecting physical jumper wires to extend dial-tone from a core PBX to an end station. One of the many and specific benefits of an IP telephony system, such as the Cisco Call Manager resident at VVC, is that MAC work is essentially eliminated as end stations can be made to work within the organization from any location connected to the campus network. It is recommended that VVC look to transition telecom support into the network operations unit and cross-train, while allowing for the specialization for voice applications to remain intact. Where some institutions may have their structured cabling systems outsourced or managed by facilities, we recommend this function remain within the networking group, insofar as small remodeling projects and one-off cabling enhancements and repairs can be done in-house. Large cabling projects associated with significant tenant improvements or campus construction should be outsourced.

A possible impediment to accomplishing a rapid transition to converging technical support of telecom as a network service is lack of adequate training for a converged network. We recommend embarking on a transition plan that will see the technicians receive the additional training and adjusted job descriptions necessary to accomplish folding this support category into the networking team. The college should also take advantage of attrition in reworking job descriptions.

6.1.2.3. Web Support

Web development needs an additional technical resource to augment the increasing development demands of web-delivered content. The college needs to be able to add portal capabilities to its web site and streaming media and other online instructional delivery modalities, which will dictate additional skills and specializations beyond a single webmaster position.

Further, the college needs to have a content management system that allows for effective decentralization of web content that can be centrally administered and secured. Workflows and approval processes for content and style should be fundamental components of the web content management system. The webmaster and web developer should be well trained in the operation and administration of this system.

PlanNet recommends that the web development positions (webmaster and web developer) be moved to the MIS department to better align these functions with enterprise and business systems.

6.1.2.4. MIS / LMS
Using outsourced programming and analyst expertise for the Datatel application seems like an effective way to deal with the various initiatives that come up in the life of an ERP and all the integration points that calls for. However, the routine duties of the MIS team need to be firewalled from the project side so that the outsourced expertise is not usurped for non-contract functions.

The addition of two programmer / analysts would bring resource capacity more in line with a functional level. In order to oversee the functions of the additional staff, a manager of enterprise systems is warranted, reporting to the director of MIS.

With respect to the Blackboard LMS, end-user training needs to be regarded as a core competency of this area. Since the headcount in this department is supposed to be set at two specialists, we recommend that one position be fairly concentrated on the training aspects of the LMS while the other serves as primary application administrator, with both positions cross-trained to support each others’ specializations.

6.1.2.5. Chief Information Officer

Upper administration lacks visibility into the pressing concerns of an aging infrastructure and thin staff allocations. A functional disconnect exists that spotlights the importance of placing these issues at the cabinet level. VVC needs an executive voice that can adequately convey the importance of IT initiatives, not just in terms of competing for dollars, but able to establish the utilitarian and non-negotiable cost-of-doing business for upkeep of infrastructure and adequate staff resourcing.

The college is especially distressed at this time with two director-level positions vacant and an interim senior IT administrator. Because of these deficiencies, the CIO position needs to be occupied by a deep-skilled technology professional capable of rebuilding an IT organization, focused on infrastructure and delivery capability.

PlanNet recommends the creation of a CIO position that reports directly to the college president and assumes the following duties and responsibilities:

- Strategic and Operational planning
  - Ex officio standing on IT governance committees (see Governance sub-section within IT Services section below)
  - Conducts strategic planning exercises
  - Operationalizes an annual tactical plan

- Contract / Vendor Management
  - Oversees all centralized purchasing and licensing
  - Administrates outsource relationships

- Program Management Office
  - Conducts project lifecycle analysis, including TCO studies
Manages the execution of the tactical plan

• Technical Architecture
  • Provides for domain expertise in the areas of networking and communications, data center operations, desktop and server standards

• Information Security
  • Conducts periodic reviews of system and data integrity
  • Performs periodic network penetration testing

• Audit disaster recovery and business continuity procedures
• Audit response plans for system breach and emergency communications

The CIO would have two direct reports: the director of Technical Services and the director of MIS.

6.1.2.6. Technical Services Organizational Structure

The following is a proposed organization structure for Technical Services that accomplishes several things:

• Folds telecom into networking, which more adequately represents the convergence of voice and data while allowing for the voice specialization for the technicians charged with the upkeep of the Call Manager application

• Promotes a network manager to oversee the architecture, security and performance of the network and servers while managing a staff to tend to care and feeding of the voice and data systems

• Establishes a manager of Desktop Services, which has oversight of both administrative and academic (computer classrooms and labs) support. There is no functional benefit for having these support groups so distinct and the organization is sacrificing the opportunity for cross over support.

• Establishes a help desk supervisor with backup. Adjunct support comes from the instructional assistants who not only provide a broad platform for basic ticket-taking functions, but also extend support to after hours for the help desk.
6.1.2.7. Management Information Systems Organizational Structure

MIS needs additional capacity to move it from its current state of maintenance and data remediation and build the capacity to take on development projects and system enhancements.

The following organizational chart represents these changes:

- A manager of enterprise systems is added to provide project management expertise and high-level systems analyst direction to the analyst / programmer team
- Adds two program development staff positions to allow for area-specific specializations, such as institutional research and financial aid
- The vacant Help Desk position is moved to Tech Services
- The instructional technology specialist (LMS / Blackboard support) positions are moved out of Tech Services and report to the Dean of Instruction
- The existing webmaster is moved from Tech Services to MIS and a new position created to support additional web development duties
- A system administrator position needs to be made distinct from the DBA role currently shared by two individuals
- A storage specialist should be added whose responsibilities are to manage SAN performance as well as archive and backup
Figure 3

6.1.2.8. Training and Professional Development

One of the outcomes of a staff that is undersized for the installed base it supports is that all efforts are spent at triage and break/fix rather than implementing enhancements that could improve the effective delivery of tech services to the end-user community. It also creates a tension for management to focus on the immediate need rather than the future capability. If staff are not given release time to attend conferences and workshops and training opportunities, they will not stay current in their technology area and the latest concepts around efficiencies and process improvements will be challenging to discover. Without an infusion of new technologies and processes, the organization slips into a mode and mentality of maintenance only, which stifles growth and development, not only for the services and applications, but also for the support staff.

It is essential that VVC make a deliberate and focused effort in this area, which will not only address the effectiveness of its employees, but also the morale. Recruitment and retention are key facets of a well-balanced professional development policy; productivity and end-user satisfaction will almost certainly be enhanced, and the mission of the college to create lifelong learning opportunities is upheld on the administrative side of the house as well. PlanNet recommends 5% of base compensation and up to 5 days per employee be set aside for professional development, conferences, or user group meetings.
6.1.2.9. Financial Impact

VVC must make a significant investment in its resources, both at the management level and technical staff level. Evidences of extended and chronic underfunding are apparent throughout the IT division, but the most severe impact has been on the capacity of its workforce. Not only are more feet on the ground needed, but an investment in the initial and ongoing training of the staff is essential to begin to establish a reputation of a division that is capable of delivering.

An assessment of current and recommended staffing levels shows that the college should expect to increase operational expenses by as much as $900,000 for additional salaries and benefits.

<table>
<thead>
<tr>
<th>VVC Tech Staffing</th>
<th>Salary &amp; Benefits</th>
<th>Current</th>
<th>Extended Sal &amp; Ben</th>
<th>Proposed</th>
<th>Extended Sal &amp; Ben</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tech I</td>
<td>$43,750</td>
<td>2</td>
<td>$87,500</td>
<td>4</td>
<td>$175,000</td>
</tr>
<tr>
<td>Tech II</td>
<td>$60,000</td>
<td>11</td>
<td>$660,000</td>
<td>14</td>
<td>$840,000</td>
</tr>
<tr>
<td>Tech III</td>
<td>$81,250</td>
<td>3</td>
<td>$243,750</td>
<td>6</td>
<td>$487,500</td>
</tr>
<tr>
<td>Media Specialist</td>
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<td>$120,000</td>
<td>4</td>
<td>$240,000</td>
</tr>
<tr>
<td>Manager</td>
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<td>0</td>
<td>$0</td>
<td>3</td>
<td>$262,500</td>
</tr>
<tr>
<td>Director</td>
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<td>$212,500</td>
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</tr>
<tr>
<td>CIO</td>
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<td>0</td>
<td>$0</td>
<td>1</td>
<td>$125,000</td>
</tr>
<tr>
<td>Total</td>
<td>$1,323,750</td>
<td>34</td>
<td>$2,342,500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Professional development costs work out to approx $2,750 per staff member, or a total of $93,700 annually.

6.2 IT Services

6.2.1 Current-State Observations and Findings

6.2.1.1. Current Technical Services

VVC Technical Services provides engineering and operational support for core IT infrastructure and technologies utilized at the college. These services have evolved over time to address particular efficiencies / economies of scale and to provide for the changing technology needs of VVC. Currently, VCC Technical Services provides for the following services:

- Network engineering and administration
- Administrative and academic desktops
- Server engineering and administration
- Telephony and communication systems
- IT budgeting and procurement
- Email and office / collaboration systems (GroupWise)
- Web management and development
6.2.1.2. High-Level Observations

- College lacks a well articulated catalog of services, leaving many constituencies confused about the offered services and expected level of support
- Operational processes are largely determined by the IT subject matter expert experience level and individual craft and not based upon documented standard operating procedures
- Service are delivered on a best-effort basis, not based upon defined service guidelines
- The college lacks effective IT governance, the absence of which has left Technical Services operating on their own in regards to definition and management of technical architecture, policy and priorities
- Technology is budgeted without a full accounting of total cost of ownership (TCO), leaving critical maintenance, technology refresh and operations (staff) costs unaccounted
- Fundamental college polices regarding IT are not defined
- Basic IT standard operating procedures are not defined / documented
- Industry-accepted project management and IT delivery methodologies are not utilized
- Technical Services does not have an effective communication plan
- The IT help desk function has insufficient structure, process and organization to effectively support VVC

6.2.1.3. IT Policies

VVC lacks IT policy definition that is fundamental to the establishment of effective IT services definition, controls and standard operating procedures, in particular, policy concerning:

- Acceptable use of IT resources
- Information security
- Electronic records archival and retention
- Email / electronic communication
- Internet access and use
• College network access

It is our understanding that VVC is in the process of ratifying an Acceptable Use policy.

Without well defined and socialized policies, Technical Services has attempted to manage services based upon general best-practices which may or may not apply to higher-education or VVC specifically. These attempts have often been met with confusion and resistance from management and faculty, and have frequently resulted in poor or incomplete implementation of systems controls.

Representative issues related to the current lack of college IT policy:

• Misalignment of IT and academic areas in use and control of network protocols such as POP3, Internet content filtering, network security and desktop standards

• Lack of definition and systems solution to provide for recovery of lost email

6.2.1.4. Customer Service Operation

VVC Technical Services provides for technology and support requests via a general purpose work request system, OPRA. Using OPRA, VCC constituents submit work requests identifying their particular service need and self-select a priority. The current system is configured to manage distinct service areas such as IT (technical services), voice systems, AV / media, web services and MIS requests.

Services are also requested via phone calls / email directly to staff and from “hallway” interactions and conversations. These direct service requests are intend to be entered into OPRA by the IT staff with varying degrees of compliance and success. Capture ratios of work requests within OPRA vary by technology area. Estimates provided in our interviews indicate that VVC is capturing roughly 50% of IT service requests within the OPRA system.

Based upon the measured OPRA requests provided to PlanNet, Technical Service is receiving roughly 10 IT formal and informal services requests per day. This does not include Web services, voice and media service requests.

Technical Services operates as a “virtual” help desk. Technical Services associates monitor the OPRA-submitted work requests for specific requests within their areas of responsibility and fulfill those requests based upon a general priority scheme and on a first-in / first-out basis. Work requests are both requests for IT services and reported IT problems (incidents).

Requested priorities are subjective based upon the following guidelines: safety and faculty / student-facing requests are considered high priority; all others are initially considered normal priority. Once assigned, technicians will generally work the request to completion based upon their workload.

Technicians will document activity and resolution narrative within the OPRA system. The criteria of whether or not to close a work request and level of status and resolution detail depend solely on the discretion of the technician resolving the incident. There is no tracking of staff effort in the OPRA system.
Although there are no established help desk service level objectives, it is Technical Services stated practice to communicate status of problem / incident work requests to requestors within 24 hours. If this is occurring, it was not corroborated by our interviews with college stakeholders who feel that they are not being proactively kept informed of their particular work request status.

Project requests (as opposed to problem / incidents) are informally prioritized based upon evaluation of VVCs broader service areas and areas of greatest need as assessed by IT management.

The majority the service request practices are not documented and exist only as general guidelines with no defined workflow, escalation process or specific communication plan. IT management does have access via OPRA to open service requests, assignments and activities, but there is no regular reporting of IT activities, resource allocation and performance to VVC management and stakeholders.

It is our assessment that the current service desk process is inefficient and inadequate to address the needs of VVC and requires significant re-engineering.

6.2.1.5. IT Operation

Standard Operating Procedures

In general, Technical Services is reliant on individual domain experts’ personal experience and craft along with general management guidance to perform their particular support activities. Other than the individual’s personal procedures and checklists, these processes are not documented or organized as standard operating procedures (SOPs).

This practice creates an environment where VVC is completely dependent on the individual technicians for continuity of service.

Configuration and Change Management

Technical Services utilizes an IT hardware and software configuration management and asset control system from Novell called ZenWorks. Currently 80% of the VCC assets are managed with ZenWorks. The remaining 20% are systems and desktops currently operating on dedicated VLANs that are managed by academic areas such as CIS, and are not currently accessible by Technical Services.

The current deployment does not identify asset physical location.

Although system changes are generally reviewed by IT management for risk and impact, Technical Services does not utilize a standardized, documented change control process to identify, plan and manage systems changes at VCC. Current process is ad-hoc and is dictated by the project scope and individuals involved.

Particularly troublesome is the lack of established maintenance windows for core systems. This is due to de-facto system availability service levels that are expected by VVC stakeholders that accommodate little or no downtime. Although 7x24 systems are not uncommon in higher-education today, the VVC IT infrastructure and systems were not architected to support this level of
service. Without predictable maintenance windows, Technical Services has historically deferred or has chosen not to perform maintenance and associated upgrades. The current situation is unacceptable and requires VVC’s attention.

**Desktop Services**

Technical Services provides for deployment, maintenance and operation of VVC desktop systems. Basic services provided are:

- Desktop PC / voice moves / adds / changes
- Software deployment
- License management
- Desktop procurement
- File/print environment

Although Technical Services provides published configurations and pricing quotes for Wintel and Mac desktops and peripherals, they do not enforce hardware standards for administrative and academic desktops. This is due to the procurement practices at the college where individual departments budget and source technology independent of IT.

Technical Services does provide for a standard software image and perform the desktop systems builds. This is problematic as the unique hardware configurations often require a unique systems build process.

Technical Services provides estimates for component repair within 24 hours. VVC’s current Dell system support agreement is best-effort with fix or replacement generally within 1 week. Technical Services will provide a temporary desktop out of inventory where possible, but do not generally stock spare equipment for this purpose.

Technical Services has no defined new user boarding / training program.

**NOC Operation**

Technical Services does not operate a formal network operations center (NOC), but does provide for basic network monitoring utilizing the AdRem NetCrunch system. System utilization and event thresholds are monitored by NetCrunch, which generates automated alerts that are pushed to technicians via email / messaging.

**IT Financial Management**

IT purchasing is de-centralized based upon department preferences and funding sources. Technology is budgeted without a full accounting of total cost of ownership (TCO) which would identify maintenance, technology refresh and operations (staff) costs.

**Technology Planning**
Technical Services does not have a formal process to identify VVC administrative and academic technology requirements and formulate a strategic and/or tactical technology plan.

6.2.1.6. Technology Governance

Although VVC does have an active technology governance process, we feel that the current process is inadequate in that the absence of a strong central authority allows projects to languish without adequate sponsorship, scope and authority to execute.

An ad-hoc technology committee functions as advisory body, recommending initiatives and project prioritization to administration for approval and funding.

The college conducts annual program reviews and accreditation cycles and brings technology-based initiatives to the technology committee.

Individually sponsored projects are brought to the administration for prioritization, but rationale behind the prioritization is often not communicated back down to project stakeholders (including Technical Services).

VVC has no process to develop a strategic technology plan that aligns the college objectives to specific IT initiatives and priorities.

6.2.2 IT Services Recommendations

6.2.2.1. Establish Fundamental IT Policies

A significant root-cause of many of VVC IT delivery and support challenges are lack of clear IT policies, without which an effective IT service delivery, aligned with the college mission, objectives and stakeholders, is impractical. Recommended policies:

- Acceptable use policy
- Information security policy
- Electronic records archival and retention policy
- Email / electronic communication policy
- Internet access and use policy
- Network access policy

Descriptions of the recommended policies are provided in Appendix 5 of this document.

Note that although there are numerous college examples/models available for the above policies, it will require significant effort and collaboration between VCC administration, faculty and IT to craft and ratify language appropriate to the VCC community.

6.2.2.2. Establish a Structured IT Help / Service Desk Function
Customer management should be a core competency of the IT service organization. A proactive, well defined service desk is a vital component of a successful IT delivery capability.

- Allocate resources to provide Level 1 support capabilities
  - Provides prompt, knowledgeable computing support services over the phone and via email
  - Moves much of day-day support burden from higher-skilled, higher-cost resources, enabling greater IT delivery capacity
  - Enables more effective use of VVC technical resources

- Level 1 help / service desk will:
  - Capture of accurate request / incident data in automated tracking system
  - Provide initial problem / incident assessment and resolution. Target 80% first call closure.
  - Verify / assign priority based upon an established policy
  - Escalate to other staff subject matter experts (Level 2) based upon a defined process
  - Manage incident closure and customer follow-up, including opt-in quality surveys and customer interviews

- Develop formal help / service desk service level objectives and escalation procedures. Escalation should consider time expended and not solely problem severity.

- Incorporate all IT service requests, including MIS, to complete the value proposition of a centralized service desk

- Replace Technical Services' OPRA system in favor of an ITIL-based service request / asset management system. Current OPRA system does not provide for best-practices service desk functionality such as:
  - Metrics for time to close; effort down to the minute
  - Intuitive end-user interface
  - Central directory authentication
  - Service alerts to end-users or technicians to escalate at certain thresholds
  - Measurement and validation of the staffing load of technicians
  - Central repository of solution history
6.2.2.3. Publish a Clearly Defined Catalog of IT Services

- Catalog to include the following information:
  - Clear description of IT products/services. Should include all IT, voice, Web, AV and MIS services.
  - Costs of service
  - Identify the process to request the service
  - Service level objective/agreement for service
  - Information required from the requestor to fulfill the request
  - Process and timeframe that requestor will receive status update on service fulfillment

- Catalog to include description of standard desktop software and functionality

- Service catalog to be Web accessible with links to IT service desk request system

6.2.2.4. Establish Service Level Objectives for Core IT Services

Service level objectives should be described in clear language with measurable service commitments for specific outcomes.

- Should include basic IT services:
  - Security/user administration
  - New user boarding
  - Hardware/software quotes and procurement
  - Desktop, voice, media systems moves/adds/changes (MAC)
  - Break/fix response and resolution
  - Help desk response time and escalation commitments

- Service levels should accommodate defined IT maintenance windows appropriate for the ongoing support of the service (see System Maintenance Windows section below)
• Performance against agreed-upon service levels becomes primary objective measures of Technical Services effectiveness

• See Appendix 6 for service level agreement example

6.2.2.5. Centralize IT Procurement

VVC should centralize all technology purchases through Technical Services. Consolidating technology purchasing will:

• Support best-practice of a managed desktop standard for administrative and academic desktops

• Enable more effective maintenance and life-cycle management

• Leverage manufactures’ corporate component standards

• Enhance hardware deployment service levels by maintaining on-hand inventory

6.2.2.6. Project Management

Establish a project management standard for use within Technical Services and train management and staff on its proper use.

• Project management components should include:
  
  o Project charter
  
  o Milestone / project plan
  
  o Project status report
  
  o Project issues document
  
  o Change control document
  
  o Post-implementation evaluation report

• Project management standard should include full system development lifecycle
  
  o Requirement specification
  
  o Conceptual design
  
  o Physical design
  
  o Solution development
  
  o Acceptance testing and certification
  
  o Implementation and training
6.2.2.7. Change Management

Implement a formal change / configuration management process to include change approval and scheduling process and documentation standards.

- Process should include the following components:
  - Process to initiate change (both emergency and scheduled changes)
  - Standards for documentation of change
  - Process to review and schedule proposed change
  - Process to implement change
  - Process to review implemented change
  - Process to manage change documentation

- Establish a formal change control committee that serves as a review and scheduling board for all submitted systems changes

- Develop and publish a college-wide technology change calendar

- See Appendix 7 for change control example process and documentation

6.2.2.8. System Maintenance Windows

Establish regular maintenance windows / schedule for core systems.

- Current 30 minute windows are viable given VVC IT architecture and application design as the VVC network and systems are not designed for non-stop operation (2N)

- 7 x 24 service commitments are not practical given VVC mission and services commitments and will require a significant investment to effectually actualize

- PlanNet recommends a weekly four to six hour maintenance window that is scheduled in advance and is accompanied with appropriate system outage notifications to impacted constituents
6.2.2.9. System Performance and Availability Reporting

Expand use of the existing suite of network monitoring tools (NetCrunch) to provide basic performance analysis and availability monitoring. This should include regular reporting (daily / weekly / monthly) of server, storage and network utilization and systems availability. The reporting is to be used by Technical Services to assess overall IT systems performance and to provide a dashboard of performance measures to VVC management.

6.2.2.10. Communication Plan

Establish a comprehensive IT communication plan directed to include all Technical Services customers, stakeholders and management.

- Identify specific communication vehicle, frequency and audience
- Plan should incorporate communication / notification activities from technology planning, project management and change management processes

6.2.2.11. Define and Document Department Standard Operating Procedures

Develop a formal guideline and documented procedures for core activities.

- Should include procedure, task description and checklists
- Effort should focus on core process such as:
  - Security / firewall changes
  - System backup and recovery
  - Desktop imaging / build
  - Physical security of data center and controlled areas
  - OS / enterprise application maintenance
- Use Change Management process example in Appendix 7 as guideline

6.2.2.12. Technology Governance

Fundamental to shared governance is collaborative decision-making. Many VVC constituent groups need to be represented and a process is needed for enrolling those sometimes disparate voices and arriving at sound decisions that have been properly challenged, vetted and prioritized against competing interests and the central mission of the college.

- Committees need to be placed into hierarchical structure
- Committees need to be established based on function
- Strategy council needs to have executive membership
• Committees need charter, mission statement, process for chair and member appointments and a communication plan

• Committees need to be empowered beyond function as advisory bodies. This includes budgetary authority and say in annual discretionary spending.

• An IT tactical plan needs to be a fully socialized list of projects / initiatives that regards the competing interests of the other constituencies

• IT management should view itself in the role of administrating the process of obtaining sign-off from the appropriate governance committee rather than from a top-level executive

There should be four governing bodies:

• Executive Technology Strategy Council (ETSC)

• Academic Technology Committee (ATC)

• Infrastructure Technology Committee (ITC)

• Enterprise Technology Committee (ETC)

Additional subcommittees can be formed to shadow IT management and serve as advisory boards. Specific examples of these are:

• Information Assurance Subcommittee

• Web Design and Planning Subcommittee

Committees meet bimonthly, subcommittees and task forces more frequently as needed. Responsibilities include:

• Determine project viability; request scope and lifecycle from IT / Technical Services

• Propose project priority and funding source (grant / local / district / capex / opex)

• Re-adjust project priorities from ETSC (iterative process)

• Review and recommend policies

• Review and recommend SLAs

• Review and recommend standards

The ETSC meets quarterly to:

• Call for updates to strategic plan (annually)

• Dictate initiatives from strategic plan
• Rationalize tactical plan to strategic plan
• Determine priority and funding for committee-vetted projects
• Recommend policy to board of governors
• Approve and enforce SLAs
• Ratify standards

The IT / Technical Services role is to staff the process of getting projects through committee. IT managers act as liaison and committee clerk, publish agenda and minutes, research committee directives, delegate and follow up on action items. Committee directives could include: cost / benefit, project initiation, funding sources.

For all committees, a clear committee charter needs to be drafted, decision-making and budgetary authority granted, and mandated communication plan implemented.

A success criterion for effective governance is consistent technology leadership that reaches across the governance committees. PlanNet recommends the creation of a cabinet-level CIO whose office would address such functions as strategic and operational planning, ex officio standing on governance committees, and management of the tactical plan.

With fundamental IT governance in place, under the direction of the IT CIO, VVC should develop a multi-year IT technology strategy and a short term (1 year) tactical
The tactical plan should incorporate all approved, funded projects and initiatives with established project completion dates.

Successful implementation of the above governance recommendations will enable:

- Unification across academic and administrative silos
- Success potential in budgeting / funding
- Systematic approach to project initiation and prioritization
- An informed community
7.0 Application Performance

The college has no formal application performance standards or established benchmarks for system performance. There are also very few tools in place to measure application performance, either as a function of server performance, application optimization or network contention and throughput.

Our information about application performance is, of necessity, anecdotal, and prompts a recommendation for investment in the kinds of tools that permit visibility into the effectiveness of system and network design and that should cost less than the overall cost of addressing performance concerns by investing in the wrong things or taking a trial-and-error approach. The availability of useful performance metrics is essential to effective capacity planning.

Two surveys were conducted that addressed the capabilities and effectiveness of the Blackboard learning management system (LMS) and WebAdvisor, the student course and information web portal. The separate surveys were targeted toward faculty and student audiences, respectively. There were 84 faculty respondents and 700 student respondents. It is on the basis of that feedback and other best practice that we make several recommendations relating to those specific applications.

7.1 Blackboard ASP

7.1.1 Current-State

7.1.1.1 Client Expectations and Benchmarks

Top issues from the faculty survey responses shows that training on Blackboard is a key deficiency, that systems performance is adequate, the user interface is adequate and that enhanced media support is lacking.

Responses from the student survey show that 87% regard the Blackboard system as containing sufficient capabilities for interacting with instructors and fellow students, validating the use of Blackboard at VVC. Two-thirds of students placed system response time as speedy or above average with only 10% placing it as below average or painfully slow. Those low-end numbers would tend to represent individual experiences or isolated conditions. It is unlikely that moving the system hardware to the VVC campus would improve system performance. To the extent that performance would need to be enhanced to drive the overall numbers higher, additional bandwidth and/or server performance could be leased from Blackboard.

7.1.1.2 System and Architecture Issues

Application performance has been dramatically improved with the move of Blackboard to an application service provider (ASP) model, which puts the operation of the server at Blackboard’s off-site hosting facility and no longer makes system response time a function of adequate hardware or network design issues. Much of the student interaction with the system occurs from off-campus, so there is no inherent benefit to placing the equipment locally. The campus connection to the Internet via CENIC should be adequate for the student and faculty connections made from the campus.

While there is a cost-to-performance benefit for licensing and hosting the equipment locally, the current budget model and staffing resource does not suggest a similar success outcome. Maintenance of the Blackboard servers would need to
be operationalized and server administration functions brought in house as core competencies.

7.1.2 Recommendations

The ASP service is running effectively in the current model and shouldn’t be disturbed.

The most significant issue surrounding Blackboard is end-user training, specifically as it relates to faculty who don’t know how to use it and can’t exploit its capabilities. The job function of providing faculty training is clearly articulated in the job description for the LMS administrator and must be executed on several times a semester. Additionally, a second support position for the LMS was called for but the position remains open.

VVC should encourage a formal program to certify faculty on the use of Blackboard in order to establish Blackboard as the learning management system of choice, secure broad adoption for its use, and create a predictable, uniform online environment for students.

7.2 Datatel / WebAdvisor / EPOS

Students use WebAdvisor as the primary portal for registration and course-related information. It is also used by faculty to retrieve class roster information and to post grades. EPOS is the telephone registration module branded at VVC as RamTalk, and provides an alternate method of performing registration and grade-retrieval activities.

In addition to academic constituents (faculty and students) interacting with WebAdvisor, there is a significant administrative constituency that looks to the Datatel Colleague student information system that stands behind WebAdvisor for conducting their day-to-day operations and fulfilling their core job functions. Departments such as Accounts Receivable, Admissions, Registrar, and Institutional Research, all rely heavily on the availability and accuracy of the Datatel system.

7.2.1 Current-State

7.2.1.1. Client Expectations and Benchmarks

Access to WebAdvisor and RamTalk by students is generally regarded as convenient and works well. In a survey of 700 students, two-thirds gave high or very high marks to WebAdvisor. Though 40% of students had never used RamTalk, most of the remaining respondents gave that system a fairly even spread of average to very high marks.

Faculty paint a different picture of WebAdvisor. Half of the 84 survey respondents said WebAdvisor was only average in its effectiveness for performing functions like posting grades and accessing class rosters. With respect to system performance, almost three-fourths said that WebAdvisor was above average or average in speediness.

Access to Datatel through the UI client interface for administrative users is somewhat reliable, according to survey respondents, and the responsiveness of the system to queries gets high marks for only half the respondents. System availability was especially affected recently by system and application upgrades surrounding the migration to Release 18 of Colleague, so responses are likely to be taking that into account.
At one time, the MIS department kept and distributed an incident log and record of system availability and downtime. A review of a three-month period near the end of 2007 shows that end users endure unplanned outages due to system events such as session locking and license limits several times a month. There is no formal communication plan for distributing information about system outages to students.

Training on WebAdvisor remained the number one issue commented upon by staff and faculty as a key shortcoming. Many indicated that the lack of training affected their perception of the capabilities of the system. Faculty will benefit from learning how to download rosters, post grades, and enter attendance data, bolstering the overall credibility of the platform.

7.2.1.2. System and Architecture Issues

VVC currently operates the Datatel system on two Production servers, one for the application and database functions and one for the web front end. While it is possible for the application and database server functions to be broken out into separate boxes, it is not typical for a site like VVC to do so without articulating specific service level objectives dictating high availability.

One method for accomplishing a system recovery option is to dedicate hardware for the Test and Development instances of the Datatel environment and to press that hardware into service as a Production box in the event of a critical component failure on the Production server. Licensing HP's Integrity Virtual Machine (IVM) software is advisable in this scenario to allow for the rapid imaging of the development server to a Production instance.

In addition to building a recoverable Production environment, it would be considered best practice to create a private network link between the application server and the web server using additional network interfaces on each to keep the intra-server traffic off of the backbone.

7.2.1.3. Reporting

Report writing is primarily centralized with some distributed report-writing capabilities available through Datatel's Query Builder. However, Query Builder is not useful for queries or reports that require joining data sets, which drives a certain amount of report-writing requests to the MIS group. With only one programmer, the backlog on report-writing is significant. Specialty report output is being produced with FormFusion, but this is primarily for cosmetic enhancements. VVC lacks an effective, full-featured, user-intuitive distributed report-writing capability. This burdens an already taxed staff with even basic report-writing functions.

7.2.1.4. Data Warehousing Project

The college has maintained a data warehouse for many years to facilitate reporting for institutional research and planning and other departments. The system is a Sybase SQL database and includes report writing through the IRQB. Nightly processes move data from the Datatel Colleague system into the data warehouse, which is regarded as effectively designed to accomplish its purpose but is in need of regular enhancements and modifications to keep it current with the requirements of the IR office.

7.2.2 Recommendations
There are several recommendations for the Datatel / WebAdvisor system:

- The servers are on lease, which is going to present an opportunity to upgrade to better hardware for the renewal period. Evaluate HP’s TiCOD as a way to build up CPU and memory capacity for access to instant capacity on demand for registration periods. HP will install CPUs and memory and only charge for their use when they are needed.

- Plan to add UniData licenses to accommodate peak periods and allocate sufficient licenses to DMI to prevent WebAdvisor from bottlenecks due to licensing limitations.

- The link between the Datatel application server and the WebAdvisor web server should be put on a private network with a cross-over cable so there is no contention with other network traffic.

- The DBA should consult with Datatel on specific recommendations around file sizing, specifically two files that are affected by registration: WWW.TOKENS and WWW.STATE. When these files are sized appropriately, search times are improved during peak periods.

- General availability of the system is hampered each morning by the file resizing activities that are occurring during the 7 o’clock hour. These resizing activities should occur during a weekend maintenance window only.

- Evaluate NetFlow data with a capable NMS system for end-to-end application performance.

- VVC should standardize on a grade-book program embraced by the faculty that allows for easy integration to Datatel.

- VVC needs a distributed reporting capability that will off-load report writing as a primary function of MIS. VVC should explore products that are being used effectively by colleges in its regional Datatel users group, such as Entrinsik Informer. There are also options through Datatel’s established partnerships that address this need. Vendors such as Business Objects and ASG-Safari offer distributed report-writing utilities, both client-based and web-based, that would allow departments to self-serve their report-writing needs.

PlanNet recommends the following actions in establishing a distributed report-writing capability:

  - Select a tool that is web-based and intuitive for end-users, including the ability to join data sets.
  - Select a tool that regards security classes so that distributed reporting does not expose data to unauthorized individuals.
  - Offer training on the distributed report writing utility.
  - Conduct routine business intelligence reviews by analysts to make sure that data elements are understood and regarded correctly by the departments making use of the utility.
• Datatel is not currently functioning as a true ERP with integration across core enterprise services. Key areas that past administrators have contemplated for integration is HR / Payroll and Financials. However, management on the finance side of the house is pleased with the current level of IT support received from the county-supported Financial 2000 platform. They have also expressed concerns about the lack of an accrual system within Datatel; that it operates strictly on a cash basis with no ability to apply payments to specific charges.

VVC stands to benefit from a fully integrated ERP, but the underlying infrastructure must be improved to the point that confidence can be restored in the ability of MIS to deliver. Any effort to incorporate new modules should be fully supported by Datatel with professional services, including project management.

• VVC is currently contracting for assistance in data warehousing and some Datatel programming. PlanNet recommends that VVC continue to look to outsourcing in order to get access to skills and competencies that may be difficult and expensive to retain on staff. Project work that relates to extending the modular function of Datatel would be excellent candidates for outsourcers such as Datatel’s own professional services or there are others, such as Rose & Tuck and SunGardHE, that have excellent qualifications.

7.3 GroupWise

7.3.1 Current-State

A survey of 199 faculty, classified staff, managers and administrators shows that, for the most part, GroupWise is satisfying the requirements of a messaging and calendaring system for VVC. Approximately 70% of respondents placed the reliability and available features at a high or very high level. Speed of message delivery is regarded very well with approximately 80% scoring it high or very high; however spam control is considered to be only somewhat effective with only 60% giving high marks in this area.

The most significant issues among respondents were lack of training and reduced feature set for off-campus access. While some may be able to access the GroupWise client by first establishing a VPN connection, most are encouraged to make use of GroupWise Web Access using a standard web browser.

Additional comments describe frustrations with the system’s handling of certain file types and file sizes, as well as the lack of support for secure protocols.

7.3.2 Recommendations

The most important issue for VVC to address in its messaging system is offering its users adequate training on the platform. Tech Services should create some specific training collateral around the concept of calendaring so that departments can make better use of scheduling tools.

PlanNet also recommends that VVC install secure messaging protocols so that all SMTP, POP3 and IMAP transactions are properly authenticated and encrypted. In addition to securing the messaging transactions, this will also enable the use of other client applications without having to first establish a VPN connection to the campus network. While opening up these services for broader use may be perceived as exposing the college to vulnerabilities, it is typical for higher education environments to meet the challenges and support its constituents with access to the most common protocols.
accommodating these other connection methods, VVC should continue to make Web Access available as the preferred method for remote access.

VVC is considering a plan for offering student email accounts, which offers the college a method for delivery of official communications to its students. Without the ability to send to a verifiable VVC domain account (which can and often will be forwarded to another account), the assurance of hitting an active, non-abandoned account is reduced and diminishes the effectiveness of official correspondence sent in this channel. VVC should be doing student email, but it should not be put on the GroupWise system and should be fully outsourced to a service like Google or MS Live, which have programs for colleges that make use of the domain address. This is not a core competency for VVC and will tax staff and server resources in addressing account management and spam.

While GroupWise is effectively serving the current needs of the campus, PlanNet recommends that VVC consider a long-term plan to migrate to a platform with broader industry adoption and better than single-digit market share. Higher education environments are extremely collaborative and the coming wave of unified communications may begin to create a tension on the ability of GroupWise to fully integrate with the most popular collaboration tools, such as Microsoft OCS or Lotus Sametime. Microsoft Exchange and Lotus Notes are the current messaging platforms that are most compatible with VVC’s Cisco Call Manager voice platform, but VVC should monitor Novell’s planned enhancements in this unified communications arena.

7.4 Financial 2000 / Snow White

7.4.1 Current-State

7.4.1.1. Client Expectations and Benchmarks

The management team that uses Financial 2000 is very pleased with system performance, support and capabilities. There are no established performance metrics or service level agreements for the delivery of the application to the college. The systems are housed at the County of San Bernardino and accessed via a web browser. Snow White is a legacy component of the financial software available through the county and is accessed via Reflection terminal emulation software. The county is showing commitment to upgrading modules that are currently still on the legacy system, however, this process is expected to take many months, even years.

There are limitations due to the lack of full integration of the financial systems with each other and with the student information system. VVC has licensed additional modules of the Datatel system for HR / Payroll and Financials in order to extend the current student information system into a functional ERP system for the college. But the current level of internal support for Datatel has represented a challenge toward adopting this. One example of a key limitation experienced by the lack of integration between Financial 2000 and Snow White is with the currency of encumbrances. Additional reporting and some manual processes must take place to create these reconciliations.

7.4.1.2. System and Architecture Issues

Legacy and Support Implications

The suite of applications comprising the Financial 2000 system, developed by the California Education Computer Consortium, is hosted on servers at the San
Bernardino County Superintendent of Schools. The county is ultimately responsible for the successful delivery of this application suite, though as a networked application it relies on the availability of wide-area network connectivity between VVC and the county's host servers. This arrangement is performing well, according to VVC management.

Reporting is done through EduReports, a reporting module of the Financial 2000 software. It is a SQL-based data warehousing repository that is kept in sync with the application database through Bridgeware. Reports are delivered to locally attached printers through the client interface.

Snow White resides on a manufacturer-obsoleted HP3000 platform hosted at the county. VVC is hosting the backup site and a county employee is responsible to come to campus to perform routine backup duties and tape rotation.

Integration To Other Campus Systems / Deficient ERP

Even though there are benefits to integrating financials to the Datatel system, the current level of support and expertise to pull this off is lacking. Management has little or no confidence in MIS to deliver at the level of county support. The college pays a tax for not having a fully integrated ERP, but they are able to successfully function in this model and significant staffing issues and competencies and track record must be established before a recommendation to change would be offered.

7.4.2 Recommendations

There are no recommendations for improved performance of the Financial 2000 software as the application is responsive and network connectivity is robust enough to support access to the county-hosted servers. The consortium that develops the Financial 2000 modules are on a track to migrate all modules to a .NET platform to further enhance system performance and extend capabilities within a web browser interface. Plans are already in place to migrate the legacy Snow White application and that process should be allowed to run its course.

7.5 Other Application Considerations

- CCCTran. CCCTran is an application from vendor XAP that enables electronic retrieval and transmittal of student transcripts. All California community colleges are urged to use this system for standardization and efficiency. VVC should investigate the costs and benefits of CCCTran and consider using it if appropriate.

- Cisco Call Manager. The campus telephone system has not been updated for several years and is many releases behind current. The hardware needs to be refreshed using industry-standard guidelines for servers of its class, particularly given the mission-critical nature of voice systems. Simply stated, this system has been neglected and needs to be upgraded in both hardware and software to allow the college to benefit from the latest stable platform that Cisco offers, operating on a Linux operating core.

- Hershey Document Imaging. The Financial Aid Department is maintaining a Hershey document imaging system that has become a repository for important and sensitive student and parent data. The administration of such a system should fall to the MIS
department as the proper stewards of mission-critical enterprise data, both for security implications as well as backup and recovery and capacity planning functions. VVC should consider document imaging for a host of other applications, but the decision needs to be strategic and should be researched in terms of broad integration across the enterprise, with specific hooks into other Datatel modules.
8.0 Registration

One of the essential life-blood systems of a college is its ability to efficiently process students through student service functions. The old paradigm of students standing in line to register for classes or purchase books is replaced by the efficiencies available in an on-line and highly connected age.

Distance learning and on-line programs make the educational space an increasingly competitive marketplace. For many academic pursuits, the regional proximity of a campus has diminishing value and heightens the importance of the online experience. Central to that experience is the process and interface that students encounter in registering and matriculating. For VVC, presenting a logical workflow and seamless end-user experience in registering for classes online is essential to the viability of the college with respect to enrollment.

8.1 Current-State

8.1.1 WebAdvisor

VVC is equipped with modern systems to accomplish online registration. Datatel's WebAdvisor interface is customizable, extensible and well integrated to the back-end student information system that it serves.

Performance of the system is satisfactory, but has a reputation of being poor in the past. The CPU load of the servers was increased last year, which would account for the testimonials of increased system performance. With the college equipped with a 155 Mbit connection to the Internet via CENIC, and a robust campus backbone of minimally 1 Gig in the distribution layer, it is likely that any performance bottleneck is occurring at the application or database server. Since no metrics are being captured by an NMS system, it is impossible to know what incidents may have historically fed into the poor reputation of system performance.

8.1.2 RamTalk

Utilization reports show that the college's telephone registration system, RamTalk, is used for 15-20% of registrations. This system is back-ended by an IVR application called EPOS that is used effectively at other community colleges using Datatel. Student satisfaction scores are sufficiently high for the small percentage of users taking advantage of RamTalk with 78% of them placing the service at average or better.

8.1.3 Walk-Up Registration

Nearly half of students are still being serviced for registration through walk-up visits to the registration office (currently, 43% of registrations are occurring via the web, 17% via telephone registration and 40% in person). This does not meet students where and how they want to be serviced for activities that are clearly deliverable in an online paradigm. It may also represent system performance issues or down time with WebAdvisor more than it does the need for direct advising from a staff person on registration questions and concerns.

8.1.4 Viability of Web-Based Registration as Primary Mode

VVC is well-positioned to handle current and future state web-based registrations due to the use of WebAdvisor. Datatel has shown strong corporate commitment to the development of its student systems, particularly as it relates to web interfaces and portals.
They have enjoyed a strong partnership with Campus Cruiser (not in use at VVC) and recently acquired Liquid Matrix, a web content management system. Migrating the entire codebase of the Colleague system to be fully Envision-based allows for any screen to be ported to WebAdvisor for an alternate web-based data entry point. This allows the resident programming staff to respond to customization requests for WebAdvisor without needing to have background in two separate systems.

8.1.5 Availability of Alternative Methods

PlanNet understands that there are currently five student information kiosks available around campus. These computer stations serve an important function by giving students direct access to data without having to stand in a line at the registrar's office. The fact that WebAdvisor is also easily accessible from open computer labs and library workstations means that VVC is adequately addressing ubiquitous access to student information. VVC should place placards at all computer lab and public workstations that show login instructions for WebAdvisor, thereby extending this kiosk functionality campus-wide.

In order to maintain accessibility for those who do not have computer access remotely, VVC should maintain its telephone registration system even as web-based registrations increase in order to address system access for that demographic that cannot conveniently visit the campus during registration periods.

8.2 Recommendations

8.2.1 Incentive Methods for Priority Registration

With almost half of students electing to register in person, either due to perceived or actual problems with the web interface, certain activities must be conducted to drive students back to the web interface in order to enjoy the efficiencies that brings and avoid the glut of lines and staff impact at registration windows. One method is to incent students by offering them priority registration via the web. Students attempting to register in person or via RamTalk would be prevented from access to course sections until the priority registration period lapsed. VVC should also establish priority registration cohorts to meter access to WebAdvisor by only permitting registrations to upper division courses or popular course sections in distinct blocks of time, thereby flattening peak access.

If contact with registration personnel is regarded as a significant touch-point that should not be lost, a recommendation would be to offer a priority call or chat service for students who are already engaged in an online registration session. This type of linkage should be created by leveraging unified communications on the college's IP-enabled voice platform and tying to a web-based plug-in for voice or instant messaging to live associates in the registrar's office. Those individuals already offering assistance to walk-up students could split time serving students at the window and taking sessions in a contact center for online support. PlanNet recommends that VVC consider such communication-enabled processes as a key distinctive and differentiator for its online experience and make investments in the technology accordingly.

8.2.2 Course Wait-Listing

One method for making the online registration process more effective and efficient is to reduce the number of visits to the website that students must make. Without course waitlists, students are faced with constantly checking back to see whether a course they desire or require has opened up. Datatel is configurable for course waitlists. Survey respondents said that, on average, they were making 4 return visits to WebAdvisor to
check on class availability because it showed initially full. That is driving traffic to a web service during peak periods and adding to impacted performance. Further, the workflow should be to trigger an alert to a student when a spot becomes available so it is based on a positive data input rather than operating in a vacuum of information.

8.2.3 Systems and Architecture

PlanNet recommends that VVC acquire server and network management systems that can archive performance data for trend analysis and to validate architectural design. Tools are needed to gather NetFlow data to judge the performance of the network with respect to the specific traffic associated to WebAdvisor, as well as adding components to the HP server that will allow the Glance tool to be used for data gathering, not merely real-time views of performance.

With respect to RamTalk, there are no critical recommendations for modifications to this secondary registration modality, other than to regularly monitor trunk utilization to ensure the system is as available as it needs to be. Currently there are sufficient trunks available for inbound calls to RamTalk and a recommendation would be to ensure enough trunk capacity to account for a shifting of the registration load should a failure of the primary web-based method occur. Our recommendation would be to increase trunk capacity accordingly and that trunk utilization be regularly reviewed and compared to actual registrations occurring to extrapolate demand for a peak scenario, such as under-performing or unavailable web access.

The college should also closely follow the enhancements available through Datatel and its partners for tighter integration with current and future WebAdvisor process flows. Since EPOS was recently acquired by TIER, some of these enhancements may be forthcoming as a result of incorporating the product into a broader portfolio.

8.2.4 Other User Interfaces

Other user interfaces are going to prove interesting and even compelling as technology advances. The proliferation of cell phones equipped with WAP browsers suggests an opportunity to allow students to interact with basic workflows or data elements. The use of communication-enabled business processes could allow a system to issue SMS text messages on certain conditions, such as enrollment status or availability of a waitlisted course. Tying business process to communications is going to become an increasingly popular theme as communication vendors, such as Cisco, promote their Unified Communication Manager platform—an early release currently in place at VVC—as a way to extend timely information to the individuals in a variety of delivery modalities (voice, video, text). PlanNet recommends that VVC look to its existing vendors and their partners to develop gateways for these communication-enabled business processes rather than build up these cutting edge capabilities in house.
9.0 Implementation Roadmap

PlanNet recommends the following actions. The schedule of activities will be determined by VVC resources and priority.

9.1 Phase One

- Governance
  - Hire a chief information officer, reporting to VVC president
  - Establish new IT governance structure
    - Create procedures for IT governance committee appointments, chair selection
    - Charter committee and appoint and designate membership
  - Establish core IT policies (including hardware standards, application benchmarks, and documentation standards)
  - Establish a district-wide IT communication plan
  - Evaluate, select and implement an emergency communications plan
  - Establish ADA policies, including a VVC periodic review of state and local regulations to ensure continued ADA compliance

- Organization
  - Establish structured IT help / service desk function (this includes staff augmentation and organizational updates)
  - Implement new staffing plan per recommendations
  - Place the existing and new LMS positions under the dean of Instruction
  - Move existing (vacant) help desk position to Tech Services and promote to supervisor level
  - Downgrade director of IAs to manager and move reporting line to director of Technical Services with dotted line to manager of Desktop Support and Help Desk supervisor
  - Move web development to MIS
  - Promote a network manager position to manager of Networks and Communication
  - Promote a DBA to systems administrator serving as lead over DBA and storage specialist
  - Converge network and telecom support in one department and cross-train techs
Rework telecom job descriptions in light of convergence

**Process**

- Create and publish a clearly defined catalog of IT services
- Establish service level objectives (SLOs) for core IT services
  - Begin with help / service desk function
  - Negotiate regular maintenance windows / schedule for network and core systems
  - Establish service level agreements for applications and hardware
- Implement procedures for testing and approving new versions of IOS
- Create hardware and software standards, including instructional technologies and ADA

**Infrastructure**

- Establish an appropriate SAN backup and recovery solution
  - Evaluate VVC’s storage SLO
  - Select and deploy an appropriately architected hardware platform based on the validated SLO
- Procure an additional tape drive to provide redundancy and faster transfer times
- Re-visit attempts to secure off-site storage services with vendors such as Iron Mountain
- Procure a software product that will enable critical files to be backed while they are still up and running

**Applications**

- Move dataset and file resizing activities to a weekend maintenance window
- Consult with Datatel on specific recommendations around file sizing, specifically two files that are affected by registration: WWW.TOKENS and WWW.STATE. When these files are sized appropriately, search times are improved during peak periods.
- Establish a private network link between the Datatel application server and the WebAdvisor web server so there is no contention with other network traffic
- Implement secure protocols for GroupWise email so end-users can use client software instead of being restricted to web access
9.2 Phase Two

- Governance
  - Create Web Design and Information Assurance task force under Enterprise Technology Committee to address immediate issues and optimize current efforts

- Organization
  - Structure
    - Hire a chief risk officer
    - Transfer instructional technology resources and responsibilities out of the IT area and under the Dean of Instruction
    - Establish a manager to provide active oversight of all instructional technology operations
    - Hire a qualified resource for the IMS technician position and multimedia production specialist
  - Training and Professional Development
    - Establish a professional development budget and release time (5% base compensation and 5 days each) for all technology areas
    - Develop training for instructional technology staff and faculty
    - Adequately train faculty in the use of WebAdvisor for downloading class rosters and uploading grades
    - Initiate training programs for faculty to improve teaching methodologies for persons with disabilities

- Process
  - Implement formal change / configuration management process
  - Define scope and standards of department standard operating procedures and begin development of documentation / checklists. May require backfill resources to free existing VCC subject matter experts to accomplish.
  - Implement industry-accepted project management and IT delivery methodology
  - Institute a business continuity program
  - Establish a storage capacity management process

- Infrastructure
Implement a redundant network Core comprised of two (2) Catalyst 6509s. In this design, all users that currently connect to the network Core would be relocated to Access Layer switches.

Create a budget and plan to replace end-of-life devices. Purchase and store two or three additional Access Layer switches as hot spares.

Solicit a secondary Internet circuit

Applications

Implement a Web content management system that includes workflow and approval processes

Add a decentralized report-writing utility for Datatel

Upgrade Datatel hardware at the renewal period with additional CPUs and memory utilizing HP’s TiCOD for access to instant capacity on demand for registration periods

Add UniData licenses to accommodate peak periods and allocate sufficient licenses to DMI to prevent WebAdvisor from bottlenecking due to licensing limitations

Roll-out new, more robust ticket tracking system

9.3 Phase Three

Process

Centralize all technology purchases through Technical Services

Infrastructure

Expand use of network monitoring tools (NetCrunch) to provide basic performance analysis and availability monitoring

Evaluate NetFlow data with a capable NMS system for end-to-end application performance

Develop a plan and a budget to either upgrade their existing APs to “thin” technology or replace the APs with current 802.11n APs. Replace the wireless LAN controller which is on the end-of-life list. Install two controllers for redundancy.

Undertake phased upgrades to all legacy instructional systems

Establish a basic instructional content production facility with fundamental recording, editing, and distribution equipment

Setup a distance learning room in a permanent location

Applications
Initiate a strategic plan to convert all systems to a fully functional Datatel ERP

Utilize a web-based priority registration system to incent students to use WebAdvisor as the primary registration modality

Allow for course wait-listing to minimize repeat visits to the registration website

Trunk the telephone registration system to accommodate a fail-safe for web registration outage

Implement an integrated grade book program that is preferred by most faculty and automates the importation of grades to Datatel

Offer chat capabilities that put students in touch with registration advisors in real-time
## 10.0 Financial Considerations

The following chart summarizes the costs associated with the implementation roadmap presented in the previous section.

<table>
<thead>
<tr>
<th>Area</th>
<th>Item</th>
<th>Estimated Cost</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infrastructure</strong></td>
<td>Implementation of redundant core</td>
<td>$403,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>End-of-life switch replacement</td>
<td>$1,811,000</td>
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<td></td>
<td>Wireless network upgrade</td>
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<td></td>
<td>NMS replacement</td>
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<td></td>
<td><strong>Sub-total for Infrastructure</strong></td>
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<tr>
<td><strong>Instructional Technology</strong></td>
<td>Upgrade smart classrooms</td>
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<td>Per room</td>
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<tr>
<td></td>
<td>Upgrade distance learning room</td>
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</tr>
<tr>
<td></td>
<td>Establish streaming media recording studio</td>
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<td></td>
<td>Podcasting server</td>
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<td></td>
<td>Recording / editing hardware and software</td>
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<td>Per room</td>
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<td><strong>Sub-total for Instructional Technology</strong></td>
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<td><strong>Business Continuity</strong></td>
<td>Redundant SAN for backup of critical data</td>
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<td></td>
<td>Redundant tape drive</td>
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<td>SAN for archive data</td>
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<td>Software package to backup open files</td>
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<td></td>
<td><strong>Sub-total for Business Continuity</strong></td>
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<tr>
<td><strong>Staffing</strong></td>
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<td>Represents an increase of $1,019,000 over current budget</td>
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<tr>
<td></td>
<td><strong>Sub-total for Staffing</strong></td>
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<td></td>
<td><strong>Grand total</strong></td>
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## 11.0 Appendices

### 11.1 Appendix 1: Core Redundancy

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<th>Qty</th>
<th>Desc.</th>
<th>List $</th>
<th>Extended List $</th>
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<td>Catalyst 6500 Enhanced 9-slot chassis, 15RU, no PS, no Fan Tray</td>
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<td>Cat 6500 Supervisor 720 with 2 ports 10GbE and MSFC3 PFC3C</td>
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</tr>
<tr>
<td>CF-ADAPTER-SP</td>
<td>2</td>
<td>SP adapter for SUP720 and SUP720-10G</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>X2-10GB-SR</td>
<td>4</td>
<td>10GBASE-SR X2 Module</td>
<td>$3,990.00</td>
<td>$15,960.00</td>
</tr>
<tr>
<td>VS-S720-10G-3C</td>
<td>2</td>
<td>Cat 6500 Supervisor 720 with 2 ports 10GbE and MSFC3 PFC3C</td>
<td>$38,000.00</td>
<td>$76,000.00</td>
</tr>
<tr>
<td>CF-ADAPTER-SP</td>
<td>2</td>
<td>SP adapter for SUP720 and SUP720-10G</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>X2-10GB-SR</td>
<td>4</td>
<td>10GBASE-SR X2 Module</td>
<td>$3,990.00</td>
<td>$15,960.00</td>
</tr>
<tr>
<td>WS-X6148A-RJ-45</td>
<td>2</td>
<td>Catalyst 6500 48-Port 10/100, Upgradable to Voice, RJ-45</td>
<td>$6,000.00</td>
<td>$12,000.00</td>
</tr>
<tr>
<td>WS-X6516A-GBIC</td>
<td>2</td>
<td>Catalyst 6500 16-port GigE Mod, fabric-enabled (Req. GBICs)</td>
<td>$15,000.00</td>
<td>$30,000.00</td>
</tr>
<tr>
<td>WS-X6548-GE-TX</td>
<td>2</td>
<td>Catalyst 6500 48-port fabric-enabled 10/100/1000 Module</td>
<td>$12,000.00</td>
<td>$24,000.00</td>
</tr>
<tr>
<td>WS-X6408A-GBIC</td>
<td>2</td>
<td>Catalyst 6000 8-port GE, Enhanced QoS (Req. GBICs)</td>
<td>$9,995.00</td>
<td>$19,990.00</td>
</tr>
<tr>
<td>WS-X6516A-GBIC</td>
<td>2</td>
<td>Catalyst 6500 16-port GigE Mod, fabric-enabled (Req. GBICs)</td>
<td>$15,000.00</td>
<td>$30,000.00</td>
</tr>
<tr>
<td>WS-G5484</td>
<td>80</td>
<td>1000BASE-SX Short Wavelength GBIC (Multimode only)</td>
<td>$500.00</td>
<td>$40,000.00</td>
</tr>
<tr>
<td>WS-C6509-E-FAN</td>
<td>2</td>
<td>Catalyst 6509-E Chassis Fan Tray</td>
<td>$495.00</td>
<td>$990.00</td>
</tr>
<tr>
<td>WS-CAC-3000W</td>
<td>4</td>
<td>Catalyst 6500 3000W AC power supply</td>
<td>$6,000.00</td>
<td>$24,000.00</td>
</tr>
<tr>
<td>CAB-AC-2500W-US1</td>
<td>4</td>
<td>Power Cord, 250Vac 16A, straight blade NEMA 6-20 plug, US</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>VS-F6K-MSFC3</td>
<td>2</td>
<td>Catalyst 6500 Multilayer Switch Feature Card (MSFC) III</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>VS-F6K-PFC3C</td>
<td>2</td>
<td>Catalyst 6500 Sup 720-10G Policy Feature Card 3C</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>VS-S720-10G</td>
<td>2</td>
<td>Catalyst 6500 Supervisor 720 with 2 10GbE ports</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>MEM-C8K-CPTFL1GB</td>
<td>2</td>
<td>Catalyst 6500 Compact Flash Memory 1GB</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>BF-ST20-64MB-RP</td>
<td>2</td>
<td>Bootflash for SUP720-64MB-RP</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>VS-F6K-MSFC3</td>
<td>2</td>
<td>Catalyst 6500 Multilayer Switch Feature Card (MSFC) III</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>VS-F6K-PFC3C</td>
<td>2</td>
<td>Catalyst 6500 Sup 720-10G Policy Feature Card 3C</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>VS-S720-10G</td>
<td>2</td>
<td>Catalyst 6500 Supervisor 720 with 2 10GbE ports</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>MEM-C8K-CPTFL1GB</td>
<td>2</td>
<td>Catalyst 6500 Compact Flash Memory 1GB</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>BF-ST20-64MB-RP</td>
<td>2</td>
<td>Bootflash for SUP720-64MB-RP</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
</tbody>
</table>

|  |  | **List Price Subtotal**                                                   | $383,900.00 |
|  |  | **Estimated 30% Discount**                                               | $115,170.00 |
|  |  | **Discounted Equipment Subtotal**                                         | $268,730.00 |
|  |  | **Professional Services Estimate (25%)**                                 | $95,975.00  |
|  |  | **10% Contingency**                                                      | $38,390.00  |
|  |  | **Estimated Project Cost**                                               | $403,095.00 |
### 11.2 Appendix 2: End-of-Life Switch Replacement

<table>
<thead>
<tr>
<th>Part #</th>
<th>Qty</th>
<th>Description</th>
<th>List $</th>
<th>Extended List $</th>
</tr>
</thead>
<tbody>
<tr>
<td>WS-C3560E-48PD-SF</td>
<td>100</td>
<td>Catalyst 3560E 48 10/100/1000 PoE+2*10GE(X2),1150W,IPB s/w</td>
<td>$14,995.00</td>
<td>$1,499,500.00</td>
</tr>
<tr>
<td>CAB-SFP-50CM-</td>
<td>100</td>
<td>Catalyst 3560 SFP Interconnect Cable, 50cm</td>
<td>$250.00</td>
<td>$25,000.00</td>
</tr>
<tr>
<td>CAB-AC</td>
<td>100</td>
<td>Power Cord,110V</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
<tr>
<td>GLC-SX-MM-</td>
<td>400</td>
<td>GE SFP, LC connector SX transceiver</td>
<td>$500.00</td>
<td>$200,000.00</td>
</tr>
</tbody>
</table>

|                  |      |                                                   |         |                 |
| List Price Subtotal | $1,724,500.00  |
| Estimated 30% Discount | $517,350.00     |
| Discounted Equipment Subtotal | $1,207,150.00  |
| Professional Services Estimate (25%) | $431,125.00     |
| 10% Contingency    | $172,450.00     |

**Estimated Project Cost** $1,810,725.00
11.3 Appendix 3: Wireless Network Upgrade

<table>
<thead>
<tr>
<th>Part #</th>
<th>Qty</th>
<th>Description</th>
<th>List $</th>
<th>Extended List $</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIR-LAP1252G-A-K9</td>
<td>68</td>
<td>802.11g/n-d2.0 2.4-GHz Mod Unified AP; 3 RP-TNC; FCC</td>
<td>$1,249.00</td>
<td>$84,932.00</td>
</tr>
<tr>
<td>AIR-WLC4404-100-K9</td>
<td>2</td>
<td>4400 Series WLAN Controller for up to 100 Lightweight APs</td>
<td>$34,995.00</td>
<td>$69,990.00</td>
</tr>
<tr>
<td>AIR-WCS-WB-1.0-K9</td>
<td>2</td>
<td>Cisco WCS Base v3.0 up to 50 Lightweight AP Win2K/2003Server</td>
<td>$3,995.00</td>
<td>$7,990.00</td>
</tr>
<tr>
<td>AIR-WCS-WLB-100EX</td>
<td>2</td>
<td>Cisco WCS Base Expansion License add 100 AP Win/Linux</td>
<td>$5,995.00</td>
<td>$11,990.00</td>
</tr>
<tr>
<td>AIR-ANT4941</td>
<td>136</td>
<td>2.4 GHz 2.2 dBi Dipole Antenna w/RP-TNC Connect. Qty. 1</td>
<td>$19.00</td>
<td>$2,584.00</td>
</tr>
<tr>
<td>AIR-ANT5135D-R</td>
<td>136</td>
<td>5GHz 3.5dBi Black Dipole Antenna w/RP-TNC connector</td>
<td>$19.00</td>
<td>$2,584.00</td>
</tr>
</tbody>
</table>

List Price Subtotal $180,070.00
Discounted Equipment Subtotal $126,049.00
Professional Services Estimate (25%) $45,017.50
10% Contingency $18,007.00

Estimated Project Cost $189,073.50
### 11.4 Appendix 4: NMS Replacement

<table>
<thead>
<tr>
<th>Part #</th>
<th>Qty</th>
<th>Desc</th>
<th>List $</th>
<th>Extended List $</th>
</tr>
</thead>
<tbody>
<tr>
<td>CWLMS-3.0-300-K9</td>
<td>1</td>
<td>LMS 3.0 WIN/SOL 300 Device Restricted</td>
<td>$15,995.00</td>
<td>$15,995.00</td>
</tr>
<tr>
<td>CWHUM-1.0-M-K9</td>
<td>1</td>
<td>CiscoWorks Health and Utilization Monitor 1.0M 300 Dev Lic</td>
<td>$3,995.00</td>
<td>$3,995.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>List Price Subtotal</th>
<th>$19,990.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated 30% Discount</td>
<td>$5,997.00</td>
</tr>
<tr>
<td>Discounted Equipment Subtotal</td>
<td>$13,993.00</td>
</tr>
<tr>
<td>Professional Services Estimate (25%)</td>
<td>$4,997.50</td>
</tr>
<tr>
<td>10% Contingency</td>
<td>$1,999.00</td>
</tr>
<tr>
<td>Estimated Project Cost</td>
<td>$20,989.50</td>
</tr>
</tbody>
</table>
### Appendix 5: IT Policy Recommendations

<table>
<thead>
<tr>
<th>Policy</th>
<th>Purpose</th>
</tr>
</thead>
</table>
| Acceptable Use Policy          | Ensure an information technology infrastructure that supports the basic mission(s) of the college. The policy’s intent is to:  
1. Ensure the integrity, reliability, availability, and operation of IT systems  
2. Ensure that use of IT systems are consistent with the principles and values that govern use of other college facilities and services  
3. Ensure that IT systems are used for their intended purposes  
4. Establish processes for addressing policy violations and recourse / sanctions for violations |
| Information Security Policy    | Defines specific information security program within the college. The policy’s intent is to:  
1. Establish a college-wide approach to information security  
2. Defines the college alignment with federal and state statutes and regulations regarding the collection, maintenance, use, and security of information assets  
3. Establishes and implements prudent and reasonable practices for the protection and security of information assets, including protection of sensitive and confidential information against accidental or deliberate unauthorized disclosure, modification or destruction  
4. Develops effective mechanisms for responding to real or perceived incidents involving breaches of information security  
Note that the college security program should be based upon best practices recommended in the “Code of Practice for Information Security Management” published by the International Organization for Standardization and the International Electro Technical Commission (ISO/IEC 17799), and tailored to the specific circumstances of the college. The program should also incorporate security requirements of applicable regulations, such as the Gramm-Leach-Bliley Act and Health Insurance Portability and Accountability Act, Family Educational Rights and Privacy Act, and industry associations such as the national EDUCAUSE Association. |
<p>| Electronic Records Archival and Retention Policy | Inform employees and department management of the requirements and responsibilities for managing, protecting and disposing of electronic records. It pertains to the legality, retention, safeguarding, backing up and future accessibility of the college’s electronic records / data. |</p>
<table>
<thead>
<tr>
<th>Electronic Communication Policy</th>
<th>Defines the privacy, confidentiality, and security of the college electronic communications. Intent:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Ensure that college electronic communications resources (email, instant messaging, live chat etc.): are used for purposes appropriate to the college mission</td>
</tr>
<tr>
<td></td>
<td>2. Inform the college community about the applicability of laws and college policies surrounding electronic communications</td>
</tr>
<tr>
<td></td>
<td>3. Ensure that college electronic communications resources are used in compliance with those laws and college policies and prevent the disruption and / or misuse of the college electronic communications resources, services, and activities</td>
</tr>
<tr>
<td></td>
<td>4. Identifies archival and retention policy for electronic communications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Internet Access / Use Policy</th>
<th>Establish guidelines for the use of campus Internet and general World Wide Web. Policy to address:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Use of Internet and computing resources by students, employees, or college guests. Policy to define acceptable and unacceptable use of Internet.</td>
</tr>
<tr>
<td></td>
<td>2. Use of college resources to access information on the Internet. Policy may differentiate between public area, lab / library access, faculty and administrative functional areas:</td>
</tr>
<tr>
<td></td>
<td>3. Use of college resources to provide information to other Internet users and communities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Network Access Policy</th>
<th>Inform the college user about what acceptable use of the college wired and wireless network.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Policy is intended to protect the staff, faculty and students and to prevent inappropriate use of the campus wired and wireless network access that may expose the college to risk, including internal / external network attacks, viruses, regulatory, administrative and legal issues.</td>
</tr>
<tr>
<td></td>
<td>The policy should also provide information regarding current and future direction of wireless deployment:</td>
</tr>
<tr>
<td></td>
<td>1. Develop a framework for a common experience for wireless users across campus</td>
</tr>
<tr>
<td></td>
<td>2. Define a security mechanism for authenticating users to wireless service</td>
</tr>
<tr>
<td></td>
<td>3. Develop expectations and guidelines for wireless usage</td>
</tr>
<tr>
<td></td>
<td>Policy is a specific expansion of the IT Security and Acceptable Use policies.</td>
</tr>
</tbody>
</table>
11.6 Appendix 6: Help Desk Service Level Agreement Example

ABC College Help Desk Service Level Agreement

Information Technology Help Desk

The Help Desk is the single point of contact for all computer, telephone, voice and media services questions, problems, and information or service requests for faculty, staff and students. The Help Desk can assist with a wide variety of technology questions, problems and requests. Whenever possible, the Help Desk staff will attempt to talk you through a solution while you are on the phone. If this is not possible, your request for service will be logged into the Help Desk tracking system and a staff member will be assigned to help you in person.

Scope

Technology support services are provided through the Information Technology Help Desk unit. This support unit is committed to delivering quality customer service and technical solutions in support of campus wide technology. To ensure the best possible support, the Help Desk provides the ABC College community with this service level agreement outlining specific services, priorities, and responsibilities related to the support of technology.

This document represents a service agreement between the Help Desk and the ABC College community who use technology and computing resources supported by Computing Services.

Note: This service level agreement is subject to modifications in response to changes in technology services and support needs.

Customer Service Statement

The Help Desk is committed to delivering quality customer service by:

- Striving to ensure customer satisfaction
- Responding to requests for support within published time frames
- Interacting with the ABC College community in a respectful and courteous manner
- Requesting feedback for opportunities for improvement
- Continuously working to improve the quality of service
- Regularly reviewing and monitoring established performance indicators
Help Desk Services

The Help Desk provides support to the entire ABC College community requiring assistance in the following areas, but not limited to:

<table>
<thead>
<tr>
<th>Electronic Communications</th>
<th>Telephony</th>
</tr>
</thead>
<tbody>
<tr>
<td>• GroupWise and Web Access to email</td>
<td>• Digital phones and voice mail</td>
</tr>
<tr>
<td>• Personal, group, and resource calendaring</td>
<td>• Modern lines (as required)</td>
</tr>
<tr>
<td>• Public folders</td>
<td></td>
</tr>
<tr>
<td>Software Support</td>
<td>Server Services</td>
</tr>
<tr>
<td>• Microsoft Office</td>
<td>• Document and file backups / restore</td>
</tr>
<tr>
<td>• Individual applications</td>
<td>• Personal network storage space</td>
</tr>
<tr>
<td>Remote Access</td>
<td>• Group network storage space</td>
</tr>
<tr>
<td>• VPN service</td>
<td>• Personal Web pages and Web space</td>
</tr>
<tr>
<td>• Dial-in service</td>
<td></td>
</tr>
<tr>
<td>Network Infrastructure</td>
<td></td>
</tr>
<tr>
<td>• Internet access</td>
<td></td>
</tr>
<tr>
<td>• Campus network</td>
<td></td>
</tr>
<tr>
<td>• Wireless access</td>
<td></td>
</tr>
<tr>
<td>Purchasing</td>
<td></td>
</tr>
<tr>
<td>• Hardware</td>
<td>Computer Security</td>
</tr>
<tr>
<td>• Software</td>
<td>• Antivirus &amp; antispyware software</td>
</tr>
<tr>
<td></td>
<td>• Anti-SPAM</td>
</tr>
<tr>
<td></td>
<td>• Operating system updates</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Computer Hardware</td>
</tr>
<tr>
<td></td>
<td>• Personal digital assistants (PDA)</td>
</tr>
<tr>
<td></td>
<td>• Computer workstation replacement schedule</td>
</tr>
<tr>
<td></td>
<td>• Printers and faxes</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Computer Accounts</td>
</tr>
<tr>
<td></td>
<td>• Network (LAN) / email account</td>
</tr>
<tr>
<td></td>
<td>• Datatel</td>
</tr>
<tr>
<td></td>
<td>• Campus website</td>
</tr>
<tr>
<td></td>
<td>• Blackboard</td>
</tr>
</tbody>
</table>

Supported Operating Systems

Windows 2003, Windows XP SP2, Mac OS 10.3 and higher.

Supported Software

Microsoft Office, Adobe Reader, Firefox, Internet Explorer, FTP Explorer, Norton antivirus software. Software packages that are used by individual departments will be supported to the following capacity:

- Consultation: Information Technology can help an individual or department choose the appropriate software for their needs
• Installation: The software can be installed and configured by Information Technology staff

• Training: The department is responsible for learning how the software package is used

Note: Due to issues of maintenance, troubleshooting, and system stability, unsupported software should not be installed on ABC owned computers unless specifically authorized by Computing Services. The Help Desk is not responsible for the loss of data or productivity due to installation of unsupported software. The Help Desk also does not provide training on specialized software that is not used campus-wide or in labs and classrooms.

Hours of Operation

Normal Business Hours

Help Desk services are available Monday through Saturday from 7:00am to 7:00pm

After Hours

When the Help Desk closes at 7:00pm, the campus community can call 123.456.7890 to connect with Help Desk @ Afterhours voicemail. When this number is called, the recording will offer several options.

For issues that arise when the Help Desk representatives are busy assisting others, please leave a request for service via voicemail at x7890 or send email to helpdesk@ABC.edu.

Requesting Assistance / Service

Help Desk services can be accessed in the following ways:

• Phone: Call the Help Desk at x7890 or 410.337.6322

• Voicemail: Leave a message on the Help Desk voice mail at x7890

• Email: Send a message with contact information and a detailed description of the request for service to helpdesk@ABC.edu

• Walk-In: Walk up to the Help Desk located next to the library at room ABC123

• Internet: Via http://www.abc.edu/helpdesk

Call Priority Levels

The Help Desk will make every effort to resolve issues at the time of the service call. This will be the initial method for resolving issues before assigning a priority level. Help Desk staff will log and assign priorities for all requests not resolved at the time of the call, based on specific definitions. Requests will be handled according to the priority assigned to them. The service level provided by the Help Desk is based on the priority of the call ticket. There are five different priority levels that can be assigned to
a ticket. The priority level is determined by the Help Desk professional receiving and entering the call.

The following table describes the priority levels assigned to requests for support resolutions and services with associated response and completion time commitments:

<table>
<thead>
<tr>
<th>Priority</th>
<th>Priority Description</th>
<th>Initial Contact by Level 1 Support</th>
<th>Initial Contact by Level 2 Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Emergency</td>
<td>5 - 20 minutes</td>
<td>15 - 30 minutes</td>
</tr>
<tr>
<td>2</td>
<td>Urgent</td>
<td>5 - 20 minutes</td>
<td>1 – 2 hours</td>
</tr>
<tr>
<td>3</td>
<td>Standard</td>
<td>5 - 30 minutes</td>
<td>3 – 4 hours</td>
</tr>
<tr>
<td>4</td>
<td>Scheduled</td>
<td>5 min - 2 hours</td>
<td>4 hours – 1 day</td>
</tr>
<tr>
<td>5</td>
<td>Informational</td>
<td>1 – 2 days</td>
<td>1 – 3 days</td>
</tr>
</tbody>
</table>

**Priority One Calls**

All calls that are determined to be priority one are considered an emergency. This means that first level support, person receiving the call, will respond in five minutes. In a very busy time period or worst case scenario, they will respond within 20 minutes. Second level support, person assigned the call, will respond in 15 minutes. A response will be made no later than 30 minutes after the call has been assigned during busy periods or worst case scenarios. The type of calls that are considered a priority one would be problems that affect a group of people. Examples of priority one calls:

- Classroom technology problems that are preventing the class from proceeding
- Internet access for the campus is down
- The ABC.edu web server is down
- Network connectivity for entire campus is down
- The email server is down

**Priority Two Calls**

All calls that are determined to be priority two are considered urgent. This means that first level support, person receiving the call, will respond in five minutes. In a very busy time period or worst case scenario, they will respond within 20 minutes. Second level support, person assigned the call, will respond in one hour. A response will be made no later than two hours after the call has been assigned during busy periods or worst case scenarios. The type of calls that are considered a priority two would be problems that affect at least one person. Examples of priority two calls:

- A faculty or staff member's computer will not work at all and that is preventing them from getting their work done
• Classroom technology problems that need to be addressed before the next class

• Network connectivity for a building is down

Priority Three Calls

All calls that are determined to be priority three are considered standard. This means that first level support, person receiving the call, will respond in five minutes. In a very busy time period or worst case scenario, they will respond within 30 minutes. Second level support, person assigned the call, will respond in three hours. A response will be made no later than four hours after the call has been assigned during busy periods or worst case scenarios. The type of calls that are considered a priority three would be problems that affect at least one person. Examples of priority three calls:

• One or more necessary applications will not work

• Classroom technology problems that does not prevent the class from proceeding

• Network connectivity for a computer is down

Priority Four Calls

All calls that are determined to be priority four, are considered scheduled. This means that first level support, person receiving the call, will respond in five minutes. In a very busy time period or worst case scenario, they will respond within two hours. Second level support, person assigned the call, will respond in four hours. A response will be made no later than one day after the call has been assigned during busy periods or worst case scenarios. The type of calls that are considered a priority four would be problems that affect a single person. Examples of priority four calls:

• A time is setup with the customer to deploy new or replacement equipment

• A customer requests assistance at specific date and time

• A customer requests equipment moves and setups

Priority Five Calls

All calls that are determined to be priority five are considered informational. This means that first level support, person receiving the call, will respond in one day. In a very busy time period or worst case scenario, they will respond within two days. Second level support, person assigned the call, will respond in one day. A response will be made no later than three days after the call has been assigned during busy periods or worst case scenarios. The type of calls that are considered a priority five would be problems that affect one or more people but do not require immediate attention and allow time for planning. Examples of priority five calls:

• A customer requests non-essential assistance without time constraints
• A customer offers suggestions that may or may not need a call back
• Information Technology initiatives or projects

Exceptions

Due to the volume of calls during the opening two weeks of school, during exam periods and in other peak volume weeks, response times may be longer than normal. Help Desk staff will inform end users if such an exception is necessary.

The Help Desk will send out campus wide emails when there is scheduled downtime for a service or unexpected outages. Requests that come in after the email has been sent out will not be responded to until the outage is over.

Response time commitments do not promise a complete resolution within the stated time frames. Rather, the time commitment is meant to indicate the maximum time interval in which the customer will be contacted by the technician assigned to the ticket. Every effort will be made to immediately respond to and resolve all priority one calls. If a solution cannot be determined, the customer will receive a couple of options that can work around their problem.

Customer Responsibilities

In order to facilitate the support process, members of the ABC College community are requested to:

• Provide detailed information regarding service requests
• Make every effort to be available to communicate with a Help Desk professional if required. A support staff member will close the call ticket if they have not received any response from the client after three attempts to contact them. This means they will try to contact the customer up to three times by email or voice mail over the course of one to two weeks.
• Provide a clean, safe and hospitable work environment for the Help Desk professional while they are in your office, lab or work area
• Read and understand all the Information Technology policies that have been approved and posted at http://www.abc.edu/itpolicies
• Provide consent for a Help Desk professional to access the computer remotely or in person in your absence when requested
• Notify the Help Desk in advance of any pre-determined required assistance
• Check the IT website frequently for information and links to self-help assistance at http://www.abc.edu/it
11.7 Appendix 7: Change Control Process Example

ABC College Change Control Procedure
IT SOP 1234

Objectives

Establish a process to track and manage changes to computerized systems and networking systems infrastructure.

Scope

This procedure applies to IT infrastructure changes made to computerized systems in ABC College’s data center and technology rooms in the following locations:

- ABC campus
- XYZ campus

This procedure applies to the following systems within the above locations:

- Environmental systems
- Computerized systems (hardware, operating system, and utility software in Production environments)
- Database management
  - Software and patch installation for Production environments
  - Database tuning and space management for Production environments
- Networking systems
- Telecommunication systems (VoIP)
- Wireless systems

This procedure applies to desktop systems with the following applications:

- Financial Edge
- Raiser’s Edge
- Datatel

Note: Requests for changes for financial systems (servers and workstations) must also have a user acceptance test case completed by a business owner of the financial system before and after changes have been implemented.
Attachments

None

Process Overview

<table>
<thead>
<tr>
<th>IT Technician</th>
<th>IT Manager</th>
<th>InfoSec Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 1 Initiate Change Request</td>
<td>Section 1 Review Proposed Change</td>
<td>Section 1 Review Proposed Change</td>
</tr>
<tr>
<td>Section 1 Log Change Request</td>
<td>Section 2 Review Closure of Change</td>
<td>Section 2 Review Closure of Change</td>
</tr>
<tr>
<td>Section 2 Implement Change</td>
<td>Section 2 Log Closure of Change</td>
<td>Section 2 Log Closure of Change</td>
</tr>
<tr>
<td></td>
<td>Section 3 Evaluate and Trend Changes</td>
<td>Section 3 Evaluate and Trend Changes</td>
</tr>
</tbody>
</table>

Initiate Change Request

Initiation

1. Fill out a Change Request Form, including the following fields:
   - CR Number: The initials of your first and last name and a 3-digit sequential number (i.e. KS001)
   - System Name
   - Servers / Devices: List of equipment to be changed
   - Change Type: Indicate “emergency” if problem occurred during non-business hours and / or the IT manager or the
InfoSec manager are not available in person to review the change request

- Notification to Users Required: Check “yes” and notify users if the system will be unavailable during business hours at any time (such as reboot of the server)

- Expected Outage: Check “yes” if the change will require outage (such as downtime to replace a part or a reboot for patches to take effect)

- Change Planned During: Indicate if the change will be implemented during business hours or non-business hours

- Proposed Start Date: This date can be coordinated with users and / or the IT manager during review

- Proposed Finish Date: This date can be coordinated with users and / or the IT manager during review

- Change Description: Explain current situation, proposed change, and proposed testing to verify change was successfully implemented. For example: The SAV client will be upgraded from version 9 to version 10. A screen print will be generated showing the client status automatically updated to reflect the current definition file.

- Reason for Change: Explain impact without change and benefits of change. For emergency change, include investigation and possible root cause. For example: The SAV client version 9 is no longer supported by the vendor. Eventually, current definition files will not be available for the version, which will make workstations vulnerable to malware.

2. Sign and date the change request

3. Forward the change request to the IT manager for review

Note: For an emergency change, contact the IT manager or Information Security manager and obtain verbal approval. Print the IT manager’s or InfoSec manager’s name and sign / date of when verbal approval was obtained.

Review Proposed Change

1. Review the change request, including assessing it for the following areas:

   - Accuracy and completeness: Appropriate technical steps and testing are documented

   - Business Impact: Evaluate impact and risk of change to the business. Identify contingency as needed, such as requiring the initiator to attach a detailed back-out plan to reverse
change if errors occurred or re-scheduling the change to be implemented during non-business hours.

2. Indicate status:
   - Approved: Initiator can continue with change
   - Returned: Depending on amount of changes to be made, inform initiator to make changes or complete another change request
   - Rejected: Initiator cannot continue with change due to cost, risk, insufficient justification, or other reason. Indicate check (√) on the Change Log to indicate the change request is closed.
   - Cancelled: Business need for the change no longer exists. Indicate check (√) on the Change Log to indicate the change request is closed.

3. Record the change request on the Change Control Log
4. Indicate the CR number on the change request
5. Photocopy the change request and file in the Change Log binder
6. Process original change request based on status:
   - Approved: Return to initiator
   - Returned: Return to initiator to be corrected or a new change request submitted. Assign same CR number and staple new change request to the old change request.
   - Rejected or Cancelled: File in Change Request binder categorized by computerized systems. Notify initiator of status.

**Implement Change**

**Work Performed**

1. Staple the original change request to a Summary of Computerized System Change Form
2. Fill out the change summary, including the following fields:
   - CR Number: Indicate the same CR number as on the change request
   - Notification to IT Department: Check “yes” and notify IT Department if any outage is expected
   - Notification to Users: Indicate if users were notified
• Backed Up System: If the server(s) contain data, check “yes” and back up the server(s) prior to implementing the change

• Work Performed: Explain steps taken to implement change and any incidents encountered, including steps to back out all or some of change if needed

• Test Results: Attach test results or explain testing conducted and results

3. Sign and date the change summary

4. Indicate status

5. Forward the change summary to the IT manager or InfoSec manager for review

Review for Closure

1. Review the change summary, including assessing it for the following areas:
   • Accuracy and completeness
   • Testing: Assess if sufficient testing was completed and if there were any incidents, they were resolved appropriately

2. If needed, return the change summary to initiator to correct, complete, and / or conduct additional testing

3. If documentation is complete, sign and date the change summary. Add any comment if needed.

4. File in Change Request binder categorized by computerized systems

5. Indicate check (√) on the Change Log to indicate the change request is closed

Review Changes

Change Log

1. Review the change log periodically to identify change requests that have been open for a long time

2. Follow up with initiators to close those change requests in a timely manner

3. Review the change log periodically to see if multiple and potentially conflicting changes are planned for the same system or several systems at the same time

Change Requests
1. Annually review the change requests by system to determine:
   • If repeated problems and changes are occurring for a system
   • If multiple small changes may cause larger impact
   • If there is a trend in the amount of types of changes

2. Identify change requests that can serve as model changes

3. Identify areas for improvement, such as testing standards

Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Change Control</td>
<td>The process for controlling, tracking, coordinating, communicating, documentating, and implementing changes</td>
</tr>
<tr>
<td>Change Control Log</td>
<td>A summary document listing all change requests initiated under this procedure, utilized to ensure all change requests are addressed and given a final disposition</td>
</tr>
<tr>
<td>Emergency Change</td>
<td>A change that is not planned in advance, but is required to be implemented immediately, to protect data integrity or prevent significant damage to equipment or facility</td>
</tr>
<tr>
<td>Incident</td>
<td>An unplanned interruption to an IT service or reduction in the quality of an IT service. Any event that could affect an IT service in the future is also an incident.</td>
</tr>
<tr>
<td>Initiator</td>
<td>ABC College IT employee or contractor / consultant initiating the change request and ensuring all deliverables are met for proper closure</td>
</tr>
</tbody>
</table>

References

1. Change Control Log binder
2. Change Request binder

Governing Regulations, Policies, and Standards

1. International Organization for Standardization (ISO) 27002:2005 Clause 12.5.1: change control procedures

Change History

<table>
<thead>
<tr>
<th>Version</th>
<th>Change</th>
<th>Effective Date</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>New procedure to establish process to track and manage changes to computerized systems.</td>
<td>01-Jan-2008</td>
</tr>
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</table>
## Change Control Log Form

<table>
<thead>
<tr>
<th>CR #</th>
<th>Initiator</th>
<th>Review Date</th>
<th>Status</th>
<th>System Name</th>
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</table>
## Change Request Form

**CR Number:**

| Change Initiation | | |
|-------------------|-------------------|
| System Name: | Servers/Devices: |

<table>
<thead>
<tr>
<th>Change Type:</th>
<th>Notification to Users Required:</th>
<th>Expected Outage:</th>
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</thead>
<tbody>
<tr>
<td>Planned</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Emergency (Obtain verbal approval.)</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Change Planned During:</th>
<th>Proposed Start Date and Time:</th>
<th>Proposed Finish Date and Time:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Business Hours</td>
<td></td>
<td></td>
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</tbody>
</table>

**Change Description (Explain current situation, proposed change, and proposed testing to verify change was successfully implemented.):**

**Reason for Change (Explain impact without change and benefits of change. For emergency change, include investigation and possible root cause.):**

**Initiator (Print Name):** Signature Date

**Review for Proposed Change**

<table>
<thead>
<tr>
<th>IT Manager (Print Name):</th>
<th>Signature (For Emergency, Initiator signs.)</th>
<th>Date</th>
</tr>
</thead>
</table>

**Status:**

- Approved
- Returned (Initiator to make modifications to CR.)
- Rejected
- Cancelled

**Information Security Manager (Print Name):** Signature (For Emergency, Initiator signs.) Date

**Status:**

- Approved
- Returned (Initiator to make modifications to CR.)
- Rejected
- Cancelled
## Summary of Computerized System Change

**CR Number:**

<table>
<thead>
<tr>
<th>Work Performed</th>
<th>Notification to IT Department:</th>
<th>Notification to Users:</th>
<th>Backed Up System:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>☐ Yes ☐ No</td>
<td>☐ Yes ☐ No ☐ N/A</td>
<td>☐ Yes ☐ No ☐ N/A</td>
</tr>
</tbody>
</table>

Work Performed (Explain steps taken to implement change and any incidents encountered, including steps to back out all or some of change if needed.)

Test Results (Attach test results or explain testing conducted and results.)

<table>
<thead>
<tr>
<th>Initiator (Print Name)</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

Status:
- ☐ Implemented with No Incident
- ☐ Implemented with Incident
- ☐ Backed Out Completely
- ☐ Cancelled

### Review for Closure

<table>
<thead>
<tr>
<th>IT Manager (Print Name)</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

Comments:

<table>
<thead>
<tr>
<th>Information Security Manager (Print Name)</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

Comments: