
FY22-23

Operational Plan

Technology Services



December 10, 2021

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Introduction

This document presents the Technology Services Department’s Operational Plan for fiscal year 2022-2023. The first chapter is an Executive Summary that provides an overview of the work accomplished in the previous year, the areas of focus in the upcoming year, and a brief description of what is anticipated in coming years. The summary also discusses what will be included in the FY22-23 budget request.

The summary is followed by three chapters that enumerate the accomplishments, detail the current needs, and lay out the road map for processes and technologies in the following service groupings:

- **Logistical Services:** these do not directly involve technology but are necessary to support the implementation and maintenance of technology.
- **Client Services:** these are delivered directly to faculty, staff, and/or students at the College.
- **Enterprise Application Services:** these pertain to software applications that support the College’s business processes rather than individual users.
- **Infrastructure Services:** these services provide the underlying technological infrastructure needed to support the other services.

Each of these chapters contain separate sections for technological or procedural categories. These sections, in turn, contain sub-sections for specific technologies or processes. Most sub-sections are then divided into three parts:

1. **Accomplishments:** describes what has been accomplished by the department over last 12-18 months, particularly as it pertains to what was laid out in the FY21-22 Operational Plan.
2. **Current Needs:** enumerates items that need to be addressed in both the remainder of the current fiscal year (FY21-22) as well as the following fiscal year (FY22-23).
3. **Roadmap:** discusses what needs to be addressed for the following three years.

Production of Annual Strategic Plan						
2020	2021	2022	2023	2024	2025	2026
FY20-21	FY21-22	FY22-23	FY23-24	FY24-25	FY25-26	
Accomplishments		Current Needs		Roadmap		

Executive Summary

This chapter provides a high-level overview of the accomplishments, current needs, and road map in each of the department's four lines of service. More detailed information for each line of service is found in the chapters that follow.

Logistical Services

The department continues to focus on formally defining standard business processes based on industry best practices that govern how the department operates.

The primary emphasis continues to be on implementing a service management approach to meeting the technology needs of the College, concentrating first on Client Services. The Employee Support and Workstation services have been defined and the department will look to define the remaining services by the end of FY22-23. The department will then move on to define the services within the other lines of service in FY23-24. Once the "Technology Services Portfolio" document is complete, the department will establish periodic service reviews with customers in order to evaluate the department's efforts to provide the defined level of service as well as to discuss possible changes to the services to better meet the College's needs.

The College has made progress with technology governance as the Technology Advisory Committee (TAC) completed its first year of operation. Its current focus is on reviewing and providing recommendations on technology proposals. In the coming year, the College needs to define TAC's relationship to governing bodies and its role in the decision-making process. Over time, the intent is for the committee to evolve from an advisory body into a steering committee for technology initiatives and projects.

The department has begun defining a standard project management methodology, starting with the creation of a Project Charter template. It will continue to develop additional document templates to support the entire methodology. Eventually, this effort will need to focus on the management of enterprise resources.

Finally, it should be noted that the department completed the Self Evaluation Report for section III. C. in the ACCJC Accreditation.

Client Services

Over the last year, the department defined the Employee Support service. It also upgraded and restructured HappyFox to support the implementation of Service Management. Next, the department will develop HappyFox reports to provide information on both historic and current workloads according to lines of service. Then, as more services are defined, it will expand reporting to include monitoring actual performance against Service Level Agreements (SLAs).

The department's current focus is on three services: COS Workstation, Classroom\Lab, and Printing. The first of these, COS Workstation, has been defined, the workstations have been inventoried, and a replacement lifecycle has been developed. The department is currently defining a COS Workstation Standard and creating a system to deploy, update, and continually enforce this standard. The

department needs to finish defining the standard and then deploy it to all the workstations in the College. The goal is to complete this by the end of the 2022 calendar year. Looking to the future, the department needs to plan to support a more mobile workforce. This includes implementing mobile device management and evaluating a virtual desktop infrastructure.

For the Classroom and Lab service, all of the existing technology needs to be inventoried and a replacement lifecycle developed. As with COS Workstations, a standard needs to be defined for Classrooms and Labs and a system implemented to deploy, update, and continually enforce this standard. Finally, this service needs to be defined in the catalog. Looking to the future, the department needs to work with Academic Affairs to develop a road map for this service.

The third service of focus is the Printing service. The department has upgraded the existing print server to the current standard, Windows Server 2019. It needs to document the existing printing infrastructure and formally define the service. In the future, the College will need to develop a plan for copiers before the current lease expires in July 2024.

The department will also look to document and define the remaining client services (File Sharing, Collaboration Tools, Telecommunications, and Physical Security) by the end of FY22-23. In the realm of physical security, the department needs to upgrade its Video Management System software from Ocularis to Panasonic and replace the Network Video Recorder (NVR) server. In addition, the College will have a professional assessment performed of the current security cameras and use the results to develop a road map.

Enterprise Application Services

In the previous year, Technology Services took several steps to improve the Enterprise Application Maintenance service. It worked with several departments to form an Enterprise Application Steering Committee to produce and maintain a production calendar that indicates when all enterprise application system maintenance will take place within the framework of the College's regular business processes. The department also moved as many automatic processes that were executed in Chron to Atomic as possible so that the College can have greater visibility and control of these jobs.

There are several pressing needs associated with the Enterprise Application Maintenance service. The vacant Application Manager position must be filled to provide not only additional bandwidth needed to handle the workload but to eliminate dependence on one individual to support the College's mission-critical applications. In light of the College's staffing vulnerabilities in this area, the department must document all Enterprise Application implementations to retain institutional knowledge and accelerate knowledge transfer when there is turnover. Since the College's agreement with Ellucian with expire June 2023, it will need to re-evaluate this agreement to determine what, if any, changes it wishes to make. The College also needs to identify and implement a single electronic signature solution to be used throughout the school. Finally, it will complete its effort to clean the Argos Report database of one-time, partially developed, and/or antiquated reports.

Looking to the future, the Enterprise Application Steering Committee will become a vehicle for developing an Enterprise Applications Run Book that documents both automatic and manual processes which are performed to maintain enterprise application systems. The College will also need to implement a project to upgrade Self-Service Banner from version 8 to 9, which will significantly alter several existing business processes and require a large amount of effort from nearly every department in the College.

Further accomplishments within this line of service include the implementation of electronic transcripts and the use of eLumen to automatically generate an online course catalog. Several additional projects will be executed in the coming year. The department will complete the first phase of the CVC Exchange project and move on to the second phase. It will also work with the Student Services division to implement a student services platform. Further, the DegreeWorks application will need to be upgraded to version 5.0.6. Finally, in a couple of years, the department will need to define all Enterprise Application services to complete the Technology Services Portfolio.

Infrastructure Services

The department's primary objective continues to be stabilizing, simplifying, and securing the College's infrastructure. To this end, the department has focused on updating several components to current versions of technology and will continue to do so in the coming year.

With the data network, the department replaced a failed core switch and rearchitected the network to eliminate a 'loop' in which traffic routed through the Internet would pass through the core switches twice. It also upgraded the DNS and DHCP servers. In the coming year, the department will focus on upgrading WiFi in the Lodges to provide broadband level connectivity for every resident. It will also strengthen security by requiring two-factor authentication to access the VPN. Looking to the future, the department will seek to simplify network administration by standardizing on Meraki switches.

The department has made progress in bringing servers up to current software versions. It has upgraded the HyperV hosts to either Windows Server 2016 or 2019. It has also retired all Windows Server 2008 systems and, in the coming year, will look to retire all Windows Server 2003 and 2012 servers. What's more, it will retire the existing Nutanix device by migrating servers to Infrastructure as a Service (IaaS) through Microsoft Azure.

Technology Services retired an old Cisco firewall as well as the VPN it provided to be replaced by a Palo Alto firewall and the more secure VPN it provides. In the coming year, the department will implement a password vault. The College will implement cyber security training that will be repeated annually and perform regular phishing tests in order to strengthen security awareness within the user community. The department will also document the firewall settings and, in the future, perform intrusion testing to verify firewall security.

In the realm of User Account Management, the department upgraded its local Active Directory from 2012 to 2019 and retired the INS domain. This year's focus will be on the development and documentation of formal processes for provisioning and de-provisioning users, both employees and students.

Finally, to strengthen the College's protection from cyber attack and expand its ability to recover from disasters, the department has moved all backups to the cloud. Moving forward, the department needs to evaluate ways it can improve business continuity and work with the entire College to develop a comprehensive disaster recovery plan.

Table Summary

The following table summarizes the accomplishments, current needs, and road map defined for every service in all lines of service. These are described in detail in the chapters that follow. Current Needs that have been prioritized by the Technology Services department are in **bold**.

Service	Accomplishments	Current Needs	Road Map
Logistical Services			
Service Management	<ul style="list-style-type: none"> Employee Support and Workstation services defined 	<ul style="list-style-type: none"> Create Technology Services SharePoint site Develop Tech Services Library and Wiki Define remaining Client Services in Service Portfolio 	<ul style="list-style-type: none"> Establish annual service reviews
Technology Governance	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Define TAC reporting relationship 	<ul style="list-style-type: none"> TAC evolution into steering committee
Project Management	<ul style="list-style-type: none"> Project Charter template created 	<ul style="list-style-type: none"> Create additional project document templates 	<ul style="list-style-type: none"> Enterprise resource management
Technology Procurement	<ul style="list-style-type: none"> ICT Accessibility Committee and Procedures 	<ul style="list-style-type: none"> Complete hardware inventory Complete software inventory Procedures to evaluate software for ICT Accessibility 	<ul style="list-style-type: none"> Identify funding responsibilities and sources Procurement-related service requests
Client Services			
Employee Support	<ul style="list-style-type: none"> Defined Employee Support service Upgraded and restructured HappyFox Implemented separate HappyFox portal for Research & Evaluation Rearranged office space and storage 	<ul style="list-style-type: none"> Develop HappyFox reports 	<ul style="list-style-type: none"> Monitoring SLA performance Automated workflow for service requests Integrate help desk and asset software
Workstation	<ul style="list-style-type: none"> Defined Workstation service Completed workstation inventory 	<ul style="list-style-type: none"> Retire Windows 7 Finish defining Workstation standard Complete Workstation Standard implementation system Deploy COS Workstation Standard 	<ul style="list-style-type: none"> Plan for mobile workforce Implement mobile device management Explore virtual desktop infrastructure (VDI)
Classroom & Labs	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Document implementation Develop hardware lifecycle Define Classroom\Lab standard Define Classroom & Labs service Incorporate into Workstation implementation system 	<ul style="list-style-type: none"> Develop with Academic Affairs

Executive Summary

Service	Accomplishments	Current Needs	Road Map
File Sharing	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Document implementation • Define service 	<ul style="list-style-type: none"> • Migrate to the cloud
Collaboration Tools	<ul style="list-style-type: none"> • Extend CC for Zoom 	<ul style="list-style-type: none"> • Develop standards and procedures for MS SharePoint and Teams • Define service 	<ul style="list-style-type: none"> • Fully implement MS SharePoint and Teams
Printing	<ul style="list-style-type: none"> • Print server upgrade 	<ul style="list-style-type: none"> • Document implementation • Define service 	<ul style="list-style-type: none"> • Plan for copier lease expiration
Telecommunications	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Document implementation • Define service 	<ul style="list-style-type: none"> • Refresh end point devices
Physical Security	<ul style="list-style-type: none"> • New cameras in RHSI • New cameras for welding 	<ul style="list-style-type: none"> • NVR Upgrade • VMS Upgrade • Document implementation • Security camera assessment • Define service 	<ul style="list-style-type: none"> • External speakers for external communication • Expand use of electronic locks
Enterprise Application Services			
Enterprise Application Maintenance	<ul style="list-style-type: none"> • Enterprise Application Steering Committee formed • Production Calendar created • Moved Chron jobs to Automic • Participated in CCCCO Effort to Develop CDP Roadmap • Filled Systems Analyst\ Programmer position 	<ul style="list-style-type: none"> • Fill Application Manager position • Develop Run Book • Implement standard electronic signature solution • Migrate Production Calendar collaborative web interface • Re-evaluate Ellucian Cloud • Clean Argos report database 	<ul style="list-style-type: none"> • Define service • Self-service dashboard report generator • Reduce dependence on consultants • Upgrade SSB 9 • Replace Luminis with Experience • Support CCCCO Efforts to Develop a CDP
Student Application	<ul style="list-style-type: none"> • Implemented electronic transcripts 	<ul style="list-style-type: none"> • Document implementation • Upgrade CVC Exchange 	<ul style="list-style-type: none"> • Define service
Instruction Application	<ul style="list-style-type: none"> • Implemented eLumen Online Catalog 	<ul style="list-style-type: none"> • Document implementation 	<ul style="list-style-type: none"> • Define service
Financial Aid Application	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Document implementation 	<ul style="list-style-type: none"> • Define service
Academic Advising Application	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Implement Student Services Platform • DegreeWorks 5.06 Upgrade • Document implementation 	<ul style="list-style-type: none"> • Define service
Finance Application	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Document implementation 	<ul style="list-style-type: none"> • Define service
Human Resource Application	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Document implementation 	<ul style="list-style-type: none"> • Define service
Payroll Application	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Document implementation • Implement FLAC 	<ul style="list-style-type: none"> • Define service

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Service	Accomplishments	Current Needs	Road Map
Library Application	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Document implementation 	<ul style="list-style-type: none"> • Define service
External Technology	<ul style="list-style-type: none"> • Require SSL on public web site 	<ul style="list-style-type: none"> • Implement Keenan security recommendations on public web site 	<ul style="list-style-type: none"> • Common branding on SSO sites • Implement Content Management System • Develop roadmap with Research and Evaluation
Infrastructure Services			
Data Network	<ul style="list-style-type: none"> • Redeploy 2nd Meraki core switch • Extend network to Herschel Meredith stadium • Deployed Wyebot WiFi monitoring • Retire Cisco AnyConnect VPN • Streamlined network architecture • DNS upgrade • DHCP upgrade • Data Center UPS Refresh 	<ul style="list-style-type: none"> • Independent mobile hotspot for IT • Monitor utilization of Yreka-Weed connection • UPS refresh in IDFs • Document LAN connections • Upgrade wireless network in lodges • Wireless system refresh • Develop WiFi coverage maps • Implement two-factor user authentication for off-campus access • Implement workstation authentication for VPN • Setup VPN to Azure cloud • Document VLANs and routing environment • Strengthen Network Communication Room security • Document climate control and UPS environment in data centers 	<ul style="list-style-type: none"> • Increase Internet bandwidth to 10Gb • Implement dual Internet connection • Standardize on Meraki network switches • Evaluate network drops\punch panels • Replace multi-mode fiber with single-mode • Plan for new lodge building • Evaluate existing routing architecture • Implement environmental monitoring in data centers • Dedicated climate control in network communications room
Servers	<ul style="list-style-type: none"> • Retired Windows 2008 operating system • HyperV hosts upgrade • Nutanix AOS upgraded • Nutanix warranty and support extended 	<ul style="list-style-type: none"> • Retire Windows 2003 and 2012 operating systems • Document virtualization environments • Document all physical servers • Retire existing Nutanix device 	<ul style="list-style-type: none"> • Retire Windows 2016 operating system • Define COS Server Standard • Create a COS Server Standard implementation system

Executive Summary

Service	Accomplishments	Current Needs	Road Map
Information Security	<ul style="list-style-type: none"> • Cisco ASA retired • Updated “COS Personal Information Security Program” document for FY21-22 	<ul style="list-style-type: none"> • Document firewall implementation • Implement Password Vault • Evaluate Windows Defender for endpoint protection • Evaluate shareware SIEM solutions • Implement annual cyber security training • Perform regular phishing tests 	<ul style="list-style-type: none"> • Create cybersecurity incident response plan • Intrusion testing • Explore Data Loss Protection solutions • Perform tabletop exercises
User Account Management	<ul style="list-style-type: none"> • INS domain retired • Active Directory (AD) upgraded from 2012 to 2019 	<ul style="list-style-type: none"> • Global Address List segregation • Develop and document formal Provisioning\De-provisioning process 	<ul style="list-style-type: none"> • Regular AD upgrades • Explore separate student domain • Retire provisioning script
Infrastructure-as-a-Service	<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Migrate to MS Azure for IaaS • Document AWS implementation 	<ul style="list-style-type: none"> • To be developed
Business Continuity\ Disaster Recovery	<ul style="list-style-type: none"> • Implemented Full Cloud-based Backup 	<ul style="list-style-type: none"> • Identify data recovery requirements • Identify single points-of-failure • Identify and prioritize critical systems • Enumerate potential disasters and probability 	<ul style="list-style-type: none"> • Upgrade backup processes for IaaS • Eliminate single points-of-failure • Develop disaster recovery plan

High-level Timeframe

The following table provides a high-level timeframe for executing the Current Needs that have been prioritized by the Technology Services department for FY22-23.

Current Need	2022												2023						
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	
Logistical Services																			
Create Technology Services SharePoint site																			
Complete Hardware inventory																			
Complete Software inventory																			
Develop Tech Services Library and Wiki																			
Define remaining Client Services in Portfolio																			
Client Services																			
Retire Windows 7																			
Finish defining Workstation Standard																			
Complete Workstation Standard implementation system																			
Deploy Workstation Standard																			
Document Printing Implementation																			
Define Printing service																			
Document classroom & labs implementation																			
Develop classroom & labs hardware lifecycle																			
Define Classroom\Lab standard																			
Deploy Classroom\Lab																			
NVR Upgrade																			
VMS Upgrade																			
Enterprise Application Services																			
Fill Application Manager position																			
Develop run book																			
Document Enterprise Application Services implementations																			
Implement standard electronic signature solution																			
DegreeWorks 5.06 upgrade																			
Migrate production calendar to collaborative interface																			
CVC Exchange - Phase II																			
Re-evaluate Ellucian cloud																			
Clean Argos report database																			
Infrastructure Services																			
Formal User Provisioning/De-provisioning process																			
Upgrade wireless in Lodges																			
Implement password vault																			
Implement two-factor authentication for off-campus access																			
Workstation certificate authentication for VPN																			
Implement annual cyber security training																			
Migrate from Nutanix to Azure IaaS																			
Retire Windows 2003 and 2012 operating systems																			
Global Address List Segregation																			
Documentation																			

Logistical Services

This chapter enumerates the accomplishments, details the current needs, and lays out the road map for business processes associated with services that do not directly involve technology but are logistical in nature.

Service Management

The College of the Siskiyous' (COS) Technology Services department has decided to adopt Information Technology Service Management (ITSM) as its approach to meeting the technology needs of the College. Under this approach, the department defines its work in terms of services that it provides to the faculty, staff, and students of COS.

ACCOMPLISHMENTS

There has been one accomplishment in this area.

Services Defined

The department has defined both the Employee Support Service and Workstation Service in the Technology Services Portfolio.

CURRENT NEEDS

There are three current needs pertaining to Service Management. Work on two of these needs will extend beyond FY22-23.

Create Technology Services SharePoint Site

The department needs to create its own SharePoint site as a central repository for the department's files and other data.

Documentation

The department needs to continue documenting all of the College's information systems. This documentation consists of two things:

- **Tech Services Library.** A repository of documents to be stored on the department's SharePoint site. The current need is to fully document the current configuration for systems used to provide Client Services, Enterprise Application Services, and Infrastructure Services.
- **Tech Services Wiki.** A collection of web pages on the department's SharePoint site that will be collaboratively maintained by all members of the department. The wiki will mimic the structure of the Implemented Services documents but focus on procedures and tasks.

Technology Services Portfolio

The department needs to continue to populate the "Technology Services Portfolio," a document that describes all of the services provided by the Technology Services department. For each service, this document describes the service, enumerates the customers who receive it, identifies its funding source(s), and sets forth either the Service Level Agreement (SLA) or the Operating

Level Agreement (OLA) associated with it. In FY22-23, the department will look to complete the definition of all remaining Client Services including:

- Classrooms & Labs
- File Sharing
- Collaboration Tools
- Printing
- Telecommunications
- Physical Security

It is expected that the entire Service Portfolio will be completed by the end of FY23-24.

ROAD MAP

There is one item on the Service Management road map.

Establish Annual Service Reviews

Once all Client Services have been defined in the portfolio, the department will establish an annual service review process with customers. This service review will include an analysis of the department's performance as it pertains to SLAs to identify areas needing improvement and a re-evaluation of the service definition to identify any adjustments that may be needed. As the remaining services are defined, these will be added to the annual review process.

Technology Governance

Technology governance ensures that technology services are properly aligned with the College's strategies and objectives. This is accomplished primarily through the Technical Advisory Committee, which consists of staff and faculty representing multiple departments and is chaired by the IT Director.

ACCOMPLISHMENTS

Beyond completing the TAC's first year of operations, no work was performed in this area.

CURRENT NEEDS

There continues to be one current need in this area.

Define TAC Reporting Relationship

As its name indicates, TAC is an advisory body that does not have decision-making authority. Its purpose is to discuss technology needs and make recommendations. The College needs to determine how these recommendations are formally related to the College's decision-making bodies as well as the role these recommendations play in the decision-making process.

ROAD MAP

There is one item on the Technology Governance road map.

TAC Evolution into Steering Committee

As technology governance matures, the College should consider evolving TAC's role as an advisory body into a steering committee for technology initiatives and projects. Once the Technology Services department's project methodology has been formally defined (see the 'Project Management' section below), there will be a need to manage resource hours involved in technology projects. Such tactical decision-making may best be handled by this committee.

Project Management

A project is defined as “a temporary endeavor undertaken to create a unique product, service, or result” (*A Guide to the Project Management Body of Knowledge: Fifth Edition*, 5). The College implements several technology-related projects utilizing staff and faculty from throughout the College simultaneously. Proper management of these projects is essential to their success.

ACCOMPLISHMENTS

There has been one accomplishment in this area.

Project Charter Template Created

A Project Charter is a document that defines the scope, schedule, and resources of a project and, when signed, formally authorizes the project. The department has created a template for the creation of such documents.

CURRENT NEEDS

There is one current need in this area.

Create Standard Project Management Methodology

The department needs to continue the creation of a standard project management methodology, by creating the following additional templates:

- Project Plan (including a GANTT) chart
- Business Requirements
- Technical Requirements
- Design
- Post-Mortem

ROAD MAP

There is one item on the Project Management road map.

Enterprise Resource Management

In conjunction with TAC, the department will need to continue on from project management to portfolio management with an emphasis on managing staff\faculty resources across multiple projects. It is crucial that the College properly budget resource hours to ensure that it does not overcommit resources and that projects can be completed on schedule.

Technology Procurement

In addition to procuring technology for its own systems, the Technology Services department assists other departments in procuring their own technology, both hardware and software. This assistance includes providing advice, obtaining quotes, submitting purchase requests, and inventorying the hardware asset or software license(s).

ACCOMPLISHMENTS

There was one accomplishment in this area.

ICT Accessibility Committee and Procedures

The department worked with staff from Academic Affairs and Student Services to develop the “ICT Accessibility Procedures” document which defined an ICT Accessibility Committee and Procedures to ensure that the information and communication technology (ICT) the College employs is accessible to staff, faculty, and students with disabilities. Academic Affairs and Student Services still need to develop one or more Instructional Material Accessibility Evaluators who have the technical expertise needed to determine whether instructional material satisfies accessibility requirements and to identify areas that may require remediation.

CURRENT NEEDS

There are three current needs in this area.

Complete Hardware Inventory

While the department has inventoried its workstations, it still needs to inventory the following hardware:

- Network switches, routers, and firewalls
- Wireless access points
- Servers
- Printers
- Classroom & Labs (PCs, projectors, Zoom equipment, etc.)

Complete Software Inventory

The department needs to create and maintain a database of all software that is purchased by the College. This database will include information about the type of software (local, client\server, or Software-as-a-Service), the license obtained, and the original funding source. This database will be stored in the department’s SharePoint site.

Procedures to Evaluate Software for ICT Accessibility

The department needs to define its procedures for evaluating software to determine whether it meets accessibility requirements before being purchased and deployed by the College.

ROAD MAP

There are two items on the Technology Procurement road map.

Identify Funding Responsibilities & Sources

The College needs to formally define who is responsible for funding various technological needs and what sources are normally used for that funding. For example, who is responsible for funding technology deployed in classrooms (Technology Services, Academic Affairs, or someone else?) and from what source funds are normally obtained (general, categorical, or grants?).

Procurement-Related Service Requests

As part of the effort to restructure HappyFox (see the ‘Employee Support Services’ section in the “Client Services” chapter below), the department needs to create procurement-specific service requests. Specifically, one service request needs to be defined for requesting quotes and procurement and another for requesting deployment of received hardware or software.

This chapter enumerates the accomplishments, details the current needs, and lays out the road map for processes and technologies that are delivered directly to faculty, staff, and/or students at the College.

Employee Support

The Technology Services department provides technology support services to employees through the Help Desk. Most support is provided via telephone or over the data network but it may also be provided in-person to locations on COS campuses.

ACCOMPLISHMENTS

There have been four accomplishments in this area.

Created Service Definition

The department fully defined the Employee Support service in the Technology Services Portfolio.

Upgraded and Restructured HappyFox

The department upgraded HappyFox, the Employee Help Desk ticketing system, from version 1.0 to 2.0. It also restructured the system along the four lines of service.

Implemented Separate HappyFox Portal for R&E

The department implemented a separate HappyFox portal to be used by Research and Evaluation (R&E) so that users can request reports from them and they can track these requests through this separate portal.

Rearranged Office Space\Storage

The department rearranged the technician workspaces to create a more open work area, making it a more customer-friendly environment and enhancing collaboration. It also recycled a significant amount of retired equipment, freeing up space for storage in the external shed. Finally, it identified rooms with the Learning Resource Center on the second level that can be used to store equipment that needs greater security and climate control.

CURRENT NEEDS

There is one current need in this area.

Develop HappyFox Reports

The department needs to develop a series of HappyFox reports to provide information about both historic and current workload.

ROAD MAP

There are three items on the Employee Support Service roadmap.

Monitoring SLA Performance

As more services are defined in the Service Portfolio, the department will need to define reports in HappyFox to indicate how well the department is meeting its Service Level Agreements (SLAs).

Automated Workflow for Service Requests

The department needs to improve service by implementing automated workflow in HappyFox for service requests, such as user provisioning requests, to ensure compliance with defined business processes. This will require an additional expenditure to upgrade the version of HappyFox currently in use.

Integrate Help Desk and Asset Software

The department uses HappyFox as a help desk ticketing system and Asset Panda for asset tracking. The department needs to find a way to integrate the two systems so that asset information can be utilized within the help desk tickets.

Workstation

Workstations are computers (desktops and laptops) that have been assigned to College of the Siskiyous' employees, both staff and faculty.

ACCOMPLISHMENTS

There were two accomplishments in this area.

Created Service Definition

The department defined the COS Workstation service in the Technology Services Portfolio.

Completed Workstation Inventory

The department completed its inventory of all workstations assigned to COS employees and developed a replacement cycle.

CURRENT NEEDS

There are four current needs in this area.

Retire Windows 7

The College has several workstations that are still running the Windows 7 operating system. Extended support for this operating system ended on 1/14/20. Consequently, Microsoft no longer makes security updates for this OS, making its use a security risk. To eliminate this risk, the department needs to retire or upgrade all workstations running this OS. This will be accomplished as the Workstation Standard is implemented as described below.

Finish Defining COS Workstation Standard

A "COS Workstation Standard" document has been created and the base hardware and software standards have been largely defined. These need to be finalized and then the department can complete the process by defining department- and individual-specific standards.

Complete Workstation Standard Implementation System

The department has deployed a new Microsoft Configuration Manager server but still needs to create a new Active Directory structure to help automatically deploy, update, and continually enforce the COS Workstation standard.

Deploy the COS Workstation Standard

Once the Workstation Standard has been fully defined and the implementation system is in place, the department needs to deploy the new standard to all workstations. The goal is to have all workstations on the new standard by the end of 2022.

ROAD MAP

There are three items on the COS Workstation road map.

Plan for Mobile Workforce

In light of the sudden shift to remote work necessitated by the COVID-19 pandemic, the College should evaluate how to accommodate a more mobile workforce, including the ability to remotely manage COS workstations. This is especially desirable in an environment where weather often requires campus closure.

Implement Mobile Device Management

The College has a significant number of iPad tablets that have been issued to staff. The department needs to implement some form of mobile device management (MDM) to properly administer and maintain these devices.

Explore Virtual Desktop Infrastructure (VDI)

As a small, rural community College, COS is faced with very limited resources for technology. The College should explore using VDI to reduce the costs associated with regular replacement of workstation hardware. VDI could also be an excellent way of accommodating a mobile workforce.

Classrooms & Labs

The College has deployed a variety of technology to be used in classrooms and labs on both the Weed and Yreka campuses. Some labs are portable so that they can be deployed anywhere.

ACCOMPLISHMENTS

No work was performed in this area.

CURRENT NEEDS

There are five current needs in this area.

Documentation

Each classroom needs to be categorized as either a traditional, standard, or smart classroom. Then, the equipment in and configuration of each standard and smart classroom as well as all labs need to be documented.

Develop Hardware Lifecycle

The documentation described above will be used to defined the hardware lifecycle for classrooms and labs.

Define Classroom\Lab Standard

The department needs to define the hardware and software standard to be used in both traditional and smart classrooms.

Service Definition

The department needs to define the Classroom\Lab service in the IT Service Portfolio.

Incorporate into Workstation Implementation System

The computers deployed in classrooms and labs should be incorporated into the same implementation system used for COS workstations (see the 'COS Workstations' section above).

ROAD MAP

The department needs to work with Academic Affairs to develop a road map for classrooms and labs.

File Sharing

Users in the College share unstructured data (i.e. data files) through file shares maintained by local Windows servers.

ACCOMPLISHMENTS

No work was performed in this area.

CURRENT NEEDS

There are two current needs in this area:

Documentation

The current file share infrastructure needs to be documented, including a list of shares, a description of their purpose, and the permissions assigned to those shares.

Service Definition

The department needs to define the File Sharing service in the IT Service Portfolio.

ROAD MAP

There is one item on the file sharing road map:

Migrate to the Cloud

The department should explore migrating unstructured data from file shares on local Windows servers to cloud-based storage. Specifically, individual data could be migrated from home folders to OneDrive while collaborative data could be migrated from file shares to SharePoint or MS Teams (see 'Collaboration Tools' below). This would allow the department to retire the File Sharing Service.

Collaboration Tools

The department provides several tools that allow staff and faculty to collaborate with one another as well as with students. Through the Chancellor's Office, the department provides Zoom for video conferencing, chat, and online classes. It also provides Microsoft Teams for video conferencing, chat, online classes, and file sharing.

ACCOMPLISHMENTS

There has been one accomplishment in this area.

Closed Captioning for Zoom

Through licensing provided by the California Community College Chancellor's Office (CCCCO), the College was able to extend the closed captioning feature in Zoom meetings to all employees.

CURRENT NEEDS

There are two current needs in this area.

Develop Standards and Procedures for MS SharePoint and Teams

The department needs to design standards and procedures for the use of MS Teams and SharePoint so that it effectively meets the College's needs and then develop a plan to implement these tools for all departments.

Service Definition

The department needs to define the Collaboration Tools service in the IT Service Portfolio.

ROAD MAP

There is one item on the Collaboration Tools road map.

Fully Implement MS SharePoint and Teams

The road map consists of executing the plan to implement MS Teams and SharePoint to all departments.

Printing

The department provides printers to users throughout the College. In many cases, these are multifunction printers that may also photocopy, scan, and/or fax.

ACCOMPLISHMENTS

There was one accomplishment in this area.

Print Server Upgrade

The print server for the Weed campus was upgraded from Windows Server 2012 (PRINTSRV01) to 2019 (COS-PRINT-WEED).

CURRENT NEEDS

There are two current needs in this area.

Documentation

The department needs to document the existing printing infrastructure and then perform a service evaluation to determine where improvements can be made. The service evaluation also needs to include a cost-benefit analysis of existing contracts.

Service Definition

The department needs to define the Printing service in the IT Service Portfolio.

ROAD MAP

There is one item on the Printing Road Map.

Copier Lease Expiration

The College's existing copier lease with Pacific Office Automation expires July 2024. In FY23-24, the College will need to develop a plan for copiers after the lease expires.

Telecommunications

The department provides Voice-Over-IP (VOIP) telecommunications services to both the Weed and Yreka campuses.

ACCOMPLISHMENTS

No work was performed in this area.

CURRENT NEEDS

There are two current needs in this area.

Documentation

The department needs to document the existing telecommunication infrastructure and then perform a service evaluation to determine where improvements can be made. The service evaluation also needs to include a cost-benefit analysis of existing contracts.

Service Definition

The department needs to define the Telecommunications service in the IT Service Portfolio.

ROAD MAP

There is one item on the telecommunications roadmap:

Refresh Endpoint Devices

The department regularly updates the servers and software that run the Voice-Over-IP (VOIP) telecommunications system, but the individual phones are nearly two decades old. Eventually, the VOIP software will no longer support the phones currently deployed so, over the next few years, the College will need to refresh its phones.

Physical Security

The department provides technology to enhance security on COS campuses. This includes surveillance cameras and electronic locks for doors.

ACCOMPLISHMENTS

There were two accomplishments in this area.

RHSI Cameras

Two additional cameras were installed on the RHSI building to provide better views of the exterior, particularly the north parking lot.

Welding Cameras

Two external cameras were installed to provide views of the welding area.

CURRENT NEEDS

There are five current needs in this area.

NVR Upgrade

The physical server that acts as the network video recorder (NVR) is out of warranty and needs to be replaced.

VMS Upgrade

Ocularis, the video management system (VMS) used by the College, costs \$2,300 software annually. The College has begun standardizing on Panasonic cameras, which are automatically licensed for Panasonic's VMS. If the College switches, there would be a one-time cost to migrate existing non-Panasonic cameras to their VMS and then, going forward, there will be no annual cost, thereby saving the College \$2,300/year. Consequently, the College should upgrade its VMS from Ocularis to Panasonic.

Documentation

The department needs to document both the existing security camera and electronic locks and then perform a service evaluation to determine where improvements can be made in each area. The service evaluation also needs to include a cost-benefit analysis of existing contracts.

Security Camera Assessment

The College needs to have a professional assessment of the College's security camera system to identify areas lacking coverage and any deficiencies with existing systems. This assessment would then provide recommendations that would become part of the road map.

Service Definition

The department needs to define the Physical Security service in the IT Service Portfolio.

ROAD MAP

There are two items on the Physical Security road map.

External Speakers for External Communication

The College needs to explore the installation of outdoor speakers that can integrate with the Informacast emergency notification system so that messages can be conveyed to those outside, particularly on the athletic fields.

Expand Use of Electronic Locks

The College should explore expanding the use of electronic locks to additional areas with heightened security concerns to take advantage of access logging capability.

This chapter enumerates the accomplishments, details the current needs, and lays out the road map for processes and technologies related to services that pertain to software applications that support the College's business processes rather than individual users.

Enterprise Application Maintenance

Enterprise application maintenance encompasses all work needed to keep systems and the integrations between them operating efficiently in support of the College's business processes.

ACCOMPLISHMENTS

There were five accomplishments in this area.

Enterprise Application Steering Committee Formed

The College formed the Enterprise Application Steering Committee to document and plan regular operations for applications used for interdepartmental business processes and to regularly review the use of these applications to identify areas for improvement and recommend long-term strategies. This committee established a charter that enumerates its membership and defines its responsibilities and began meeting quarterly.

Production Calendar Created

The aforementioned Enterprise Application Steering Committee created a shared production calendar to indicate when all system maintenance activities will take place within the framework of the College's regular business processes.

Moved Chron Jobs to Automic

All automatic processes that could be moved from Chron in the College's Banner system were moved to Automic. This gives the department direct access to these jobs rather than having to work with the Ellucian Cloud team, which experience shows is a slow and cumbersome process.

Participated in CCCCCO Effort to Develop CDP Roadmap

The California Community College Chancellor's Office (CCCCO) has initiated a project to consider the development of a Common Data Platform (CDP) that would be available to all districts in the CCC system. The CDP's objectives are to lower costs, improve support, align business processes, increase agility and resiliency, and reduce technical and functional staff effort. The Chancellor's Office engaged Huron Consulting to develop a roadmap for the implementation of the system and develop a systemwide budget projection. At the request of the Chancellor's office, COS participated in this process by participating in a series of workshops to provide information about our current operations and costs.

Filled Systems Analyst\Programmer Position

The individual serving as the interim Systems Analyst\Programmer position resigned in July 2021. The department updated the job description and then launched a successful recruitment to permanently fill this position.

CURRENT NEEDS

There are six current needs in this area.

Fill Application Manager Position

The individual in the Application Manager position resigned in November 2021. The department needs to update the job description and needs to fill this vacancy to provide a much-needed second resource on the Enterprise Application team.

Develop Run Book

The College needs to create a run book that defines both automatic and manual processes that are performed to maintain its enterprise application systems. This effort will begin internally within the Technology Services department and expand to engage the Enterprise Application Steering Committee.

Implement Standard Electronic Signature Solution

As remote distance learning becomes more common, the College needs to enhance its ability to receive documents with electronic signatures. Currently, some departments use Adobe Sign while others use DocuSign. Many departments do not have any ability to receive electronically-signed documents. The College needs to implement a single software solution for processing electronic signatures that is available in all departments.

Migrate Production Calendar Collaborative Web Interface

Currently, the Production Calendar is maintained as an Excel spreadsheet stored in a file share. The department needs to migrate the calendar to a web interface that is more accessible to users. Further, it needs to improve the ability to collaborate by categorizing jobs on the calendar and enabling the ability to filter the view to focus on just one or more categories.

Re-evaluate Ellucian Cloud

The College spends \$320,000 a year to have Ellucian host its Banner system in the cloud. The College's experience with this service has been poor. Response and resolution times on high priority issues have been unacceptably high. The same is true of routine requests. The College could utilize another cloud provider and employ its own support person for less than the current cost and significantly improve the level of service. The College should explore the work effort and costs associated with making such a transition in order to perform a cost-benefit analysis of this option. The existing agreement with Ellucian Cloud ends in June 2023. Consequently, any efforts to move to another cloud provider would have to be executed in FY22-23.

Clean Argos Report Database

The Argos server's report database has a significant number of one-time, partially developed, and/or antiquated reports. While much progress has been made to identify and remove such reports from the system, this effort needs to be continued to completion.

ROAD MAP

There are six items on the Enterprise Application Maintenance road map.

Define Service

The department needs to define the Enterprise Application Maintenance service in the Technology Services Portfolio.

Self-Service Dashboard Report Generator

The College needs to create a self-service dashboard where users can quickly and easily see commonly requested data and have access to a tool that allows them to generate their own simple reports rather than having to submit a service request to Technology Services.

Reduce Dependence on Consultants

Currently, the department engages the services of consultants, remote programmer analysts, to provide technical expertise and troubleshooting assistance with Banner. The College needs to deepen the skill set of its existing staff so that resources currently used for consultants can be used for permanent staffing. This will reduce the department's dependence on consultants, increase the number of resource hours available for projects, and give the ability to develop staff internally.

Upgrade SSB 9

The Self-Service Banner interface needs to be upgraded to the current version. This is a significant effort that will require significant staff time and expertise from outside consultants.

Replace Luminis with Experience

Luminis provides a web-based interface to the College's Enterprise Resource Planning (ERP) system known as MySiskiyous. Ellucian intends to retire this solution to be replaced by a new solution known as Experience. The College's existing license for Luminis expires June 2023 and product support this product will end June 2024 so the product replacement will need to take place before then.

Support CCCCCO Efforts to Develop a CDP

As discussed under 'Achievements' above, the California Community College Chancellor's Office (CCCCO) has initiated an effort to develop a Common Data Platform (CDP) that would be available to all districts in the CCC system. Because COS has a significant interest in the realization of the CDP's objectives, the College will continue to assist the CCCCCO in these efforts.

Student Application Service

The Student Application Service encompasses all technologies and work processes that enable all business processes pertaining to the student life cycle from application to graduation.

ACCOMPLISHMENTS

There was one accomplishment in this area.

Implemented Electronic Transcripts

The College implement integration between Banner and the National Student Clearinghouse to provide electronic transcripts to students.

CURRENT NEEDS

There are two current needs in this area.

Documentation

The department needs to document the technologies and work processes associated with Student Application Services and then perform a service evaluation to determine where improvements can be made.

Upgrade CVC Exchange

The California Virtual Campus (CVC) is a web site created and maintained by the California Community Colleges (CCC) Chancellor's office. It allows students to search for and enroll in online courses offered at community colleges throughout the state. Currently, the College of the Siskiyous (COS) provides information about its courses to the CVC through a data file that is automatically created and updated on a daily basis.

The CVC Exchange project seeks to improve this interaction through two phases. Currently, the department is implementing the first phase in which the daily file upload is replaced by an Application Programming Interface (API) that allows the CVC web site to dynamically retrieve course information from the College's Student Information System (SIS), Banner, as needed. In the second phase, the existing API will be further configured to write registration data received through the CVC web site into Banner. This phase will require the creation and modification of several business processes to accommodate this new method of registration. In phase II, the CVC web site will be configured to use the COS' payment gateway, TouchNet, to process payments for the course from students.

ROAD MAP

Define Service

The department needs to define the Student Application service in the Technology Services Portfolio.

Instruction Application Service

The Instruction Application Services encompasses all technologies and work processes that enable all business processes pertaining to the delivery of instruction to students.

ACCOMPLISHMENTS

There was one accomplishment in this area.

Implemented eLumen Online Catalog

The College implemented eLumen Online Catalog software to produce the catalog for the 2021-2022 academic year.

CURRENT NEEDS

There is one current need in this area.

Documentation

The department needs to document the technologies and work processes associated with Instruction Application Services and then perform a service evaluation to determine where improvements can be made.

ROAD MAP

There is one item on the Instruction Application road map.

Define Service

The department needs to define the Instruction Application service in the Technology Services Portfolio.

Financial Aid Application Service

The Financial Aid Application Service encompasses all technologies and work processes that enable all business processes pertaining to providing financial assistance to students.

ACCOMPLISHMENTS

No work was performed in this area.

CURRENT NEEDS

There is one current need in this area.

Documentation

The department needs to document the technologies and work processes associated with Financial Aid Application services and then perform a service evaluation to determine where improvements can be made.

ROAD MAP

There is one item on the Financial Aid Application road map.

Define Service

The department needs to define the Financial Aid Application service in the Technology Services Portfolio.

Academic Advising Application Service

The Academic Advising Application Service encompasses all technologies and work processes that enable all business processes pertaining to the providing of academic advice and counseling to students.

ACCOMPLISHMENTS

No work was performed in this area.

CURRENT NEEDS

There are three current needs in this area.

Implement Student Services Platform

A couple of years ago the College purchased and began to implement SARS (Scheduling And Reporting System) Anywhere software but this project lost momentum and was never completed. The existing licensing expires December 2021. Currently, the Student Services division is evaluating their needs to determine a path to implement such a platform. It will need to determine whether SARS can still adequately meet this need or a new solution will need to be identified, procured, and implemented. Technology Services will need to assist with the implementation of this path once developed. (Note, this effort was previously titled 'Unified Student Interaction System.')

Degree Works 5.06 Upgrade

To stay current, the College needs to upgrade the DegreeWorks application from version 5.0.1 to 5.06.

Documentation

The department needs to document the technologies and work processes associated with Academic Advising Application Services and then perform a service evaluation to determine where improvements can be made.

ROAD MAP

There is one item on the Academic Advising road map.

Define Service

The department needs to define the Academic Advising service in the Technology Services Portfolio.

Finance Application Service

The Finance Application Service encompasses all technologies and work processes that enable all standard accounting business processes.

ACCOMPLISHMENTS

No work was performed in this area.

CURRENT NEEDS

There is one current need in this area.

Documentation

The department needs to document the technologies and work processes associated with Finance Application services and then perform a service evaluation to determine where improvements can be made.

ROAD MAP

There is one item on the Finance Application road map.

Define Service

The department needs to define the Finance Application service in the Technology Services Portfolio.

Human Resource Application Service

The Human Resource Application Service encompasses all technologies and work processes that enable all business processes pertaining to the management of staff, faculty, and student workers.

ACCOMPLISHMENTS

No work was performed in this area.

CURRENT NEEDS

There is one current need in this area.

Documentation

The department needs to document the technologies and work processes associated with Human Resource Application Services and then perform a service evaluation to determine where improvements can be made.

ROAD MAP

There is one item on the Human Resource Application road map.

Define Service

The department needs to define the Human Resource Application service in the Technology Services Portfolio.

Payroll Application Service

The Payroll Application Service encompasses all technologies and work processes that enable all business processes pertaining to the payment of wages and the provision of benefits to employees.

ACCOMPLISHMENTS

No work was performed in this area.

CURRENT NEEDS

There are two current needs in this area.

Documentation

The department needs to document the technologies and work processes associated with Payroll Application Services and then perform a service evaluation to determine where improvements can be made.

Implement FLAC

The College purchased Ellucian's Faculty Load and Compensation (FLAC) module in order to automate much of the payroll process. Unfortunately, it has encountered significant obstacles in the implementation of this module. The College needs to fully implement the FLAC module in order to fully realize its benefits.

ROAD MAP

There is one item on the Payroll Application road map.

Define Service

The department needs to define the Payroll Application service in the Technology Services Portfolio.

Library Application Service

The Library Application Service encompasses all technologies and work processes that enable all business processes pertaining to the library services to students.

ACCOMPLISHMENTS

No work was performed in this area.

CURRENT NEEDS

There is one current need in this area.

Documentation

The department needs to document the technologies and work processes associated with Library Application Services and then perform a service evaluation to determine where improvements can be made.

ROAD MAP

There is one item on the Library Application road map.

Define Service

The department needs to define the Library Application service in the Technology Services Portfolio.

External Technology Service

This section differs from the previous sections in that it does not discuss services provided by the Technology Services department but instead examines technology services that are provided by other departments in the College. Thus, what follows are not the accomplishments, current needs, and road map for the services (which would be developed by the other departments), but the accomplishments, current needs, and road map for the department's efforts to support these services.

PUBLIC WEB SITE

The appearance and content of the public web site is the responsibility of the Web Links team, which consists of the Distance Learning Coordinator and an Instructional Support Specialist. The Technology Services department supports the underlying servers.

Accomplishments

There was one accomplishment in this area.

Require SSL on Public Web Site

To improve security and follow current industry best practice, the College's public web site content was configured to require digital certificates for all content (i.e. SSL).

Current Needs

There is one current need in this area.

Implement Keenan Security Recommendations

The College received a Security Scorecard from Keenan, its security provider, with a list of recommendations to improve security on the school's public web site. The most pressing recommendation, requiring SSL, has been implemented. The remaining recommendations still need to be implemented.

Road Map

There are two items on the public web site road map.

Common Branding on SSO Sites

The College needs to look to implement the same look-and-feel (i.e. brand) on all of the web sites that utilize the College's single sign-on (SSO) solution.

Content Management System

Currently, the Web Links team makes changes to the content and appearance of the public web site by modified HTML code through Adobe Dreamweaver. The College should consider adopting a content management system (CMS) that will allow users to make basic content changes on their own.

RESEARCH AND EVALUATION

The Research and Evaluation team is responsible for assisting departments throughout the College in meeting governmental reporting requirements and in performing data analysis to assist in decision-making.

Accomplishments

No work has been performed in this area.

Current Needs

No current needs have been identified in this area.

Road Map

The department needs to work with Research and Evaluation to develop a road map.

This chapter enumerates the accomplishments, details the current needs, and lays out the road map for processes and technologies related to services that provide the underlying technological infrastructure needed to support the other services. It follows a different pattern than the previous chapters. In previous chapters, each section corresponds to a particular service which is then divided into three sub-sections: accomplishments, current needs, and road map. In this chapter, each section still corresponds to particular services but is then divided into sub-sections for specific technologies used to provide the service. Accomplishments, current needs, and road map are then specified for each technology rather than for the service.

Data Network

This section enumerates the accomplishments, details the current needs, and lays out the road map for technologies with the College's data network.

INTERNET CONNECTION

The College's Internet connection is a critical component in the Network Infrastructure on which nearly all of IT's services depends. Consequently, improving the performance and reliability of this connection is a departmental priority.

Accomplishments

No work was performed in this area.

Current Needs

There is one current need in this area.

Independent Mobile Hotspot for IT

The department needs to have a mobile hotspot that provides an independent Internet connection through a mobile data service. This will allow the IT department to troubleshoot Internet connectivity and to test external access on-site.

Road Map

There are two items on the Internet Connection road map.

Increase Bandwidth

The bandwidth on the existing connection through CENIC is 1Gb, but is capable of increasing to 10Gb. Currently, 1Gb is sufficient. However, as Internet usage increases, the College will need to look at increasing the bandwidth. Such an increase can be expected as the College intends to build additional lodges to house another 300+ students. Increasing the bandwidth will result in increased operational costs for the CENIC connection.

Dual Connection

The single CENIC connection represents a single point of failure. If this connection fails, those on campus cannot connect to essential resources on the Internet such as the Student Information System (Banner) and technologies used for online classes such as the Learning Management System (Canvas), Zoom, and Microsoft Teams. Once the Nursing program upgrade their simulation software to SimCapture, this will also become dependent on the Internet connection.

The College could eliminate this single point of failure by implementing a second Internet connection to the Yreka campus. This would require securing additional funding for a second connection as well as a second firewall to secure the connection. With the Nursing program's dependency on this connection, it may be possible to use RHSI funding. (For further discussion, see 'Road Map' under 'Yreka-Weed Connection' below.)

YREKA-WEED CONNECTION

The College has a private data circuit that connects the Yreka campus to the Weed campus. This connection is vital to the Yreka campus because it is used by nearly all IT services on that campus.

Accomplishments

No work was performed in this area.

Current Needs

There is one current need in this area.

Monitor Utilization

So far, the 100Mb bandwidth on this connection has been sufficient, but the IT department will need to monitor utilization of this link to see if an increase in bandwidth is needed.

Road Map

There is one item on the Yreka-Weed connection road map.

Dual Internet Connection

As discussed in the 'Road Map' for the 'Internet Connection' above, the single CENIC connection represents a single point of failure for both the Weed and Yreka campuses. The Yreka-Weed connection is another single point of failure for the Yreka campus. If this link fails, the Yreka campus loses access to both the Internet and resources on the Weed campus such as the College's file servers and the phone system. Implementing a second Internet connection would eliminate the single point-of-failure for the Internet. What's more, if a VPN was established between the Yreka and Weed campus as a secondary route, the single point-of-failure could be eliminated for the resources on the Weed campus as well.

NETWORK SWITCHES

Network switches are the devices that provide network connectivity between all devices on the College's data network. Thus, they are the primary means by which the Data Network service is provided. Because all IT services are dependent on this service, these devices must be capable of providing the level of service these other services require.

Accomplishments

There was one accomplishment in this area.

Redeploy Second Meraki Core Switch

The College had to RMA one of its two Meraki MS425 core switches because it malfunctioned continually bringing down the entire network and Meraki could not resolve the issue. The network had to be temporarily rearchitected with one core switch until the replacement was received and could be redeployed.

Current Needs

There is one current need in this area.

UPS Refresh in IDFs

The College experiences frequent power outages, particularly on the Weed campus. While there is a generator to provide back-up power on the Weed campus, there is normally a brief interruption as the supply of power switches to the generator. This temporary loss of power has caused network switches in several IDFs to shut down and then boot up when the power is restored, causing a network outage. Several of these switches provide power-over-Ethernet (POE) to phones. This means that both the Data Network Service and Telecommunications Service would be disrupted by this outage. The College needs to deploy Uninterruptible Power Supplies (UPS) to provide sufficient power during the power switch so that these services are not disrupted during a switch from commercial to generator power or back.

Road Map

There is one item on the road map for network switches.

Standardize on Meraki Network Switches

The College has experienced a number of issues rooted in having a mix of two network switch vendors: Cisco and Meraki. To avoid these issues, the College needs to standardize on a single network vendor. Cisco switches are more costly largely because they provide advanced features not available in Meraki. Since the College does not need those advanced features, the department intends to standardize on Meraki switches.

There are two other important benefits to standardize on Meraki switches. First, because they are managed through a graphical, cloud-based interface, administering Meraki switches requires a lower skill set than Cisco switches, which require knowledge of the Cisco command line interface (CLI). Second, the College utilizes Meraki for its wireless network and can be administered through the same interface as the network switches. Consequently, standardizing on Meraki would lower the total cost of ownership (TCO) for the network switches.

The licensing for the Meraki switches ends August 2023 so a path will need to be set by FY23-24.

LAN CONNECTIONS

Local Area Connections (LAN) are the connections from endpoints to network switches as well as connections between buildings on the same campus.

Accomplishments

There was one accomplishment in this area.

Extend Network to Herschel Meredith Stadium

The department had single-mode fiber pulled to and installed a network switch in the press box in the football stadium, thereby extending the data network to the football stadium.

Current Needs

There is one current need in this area.

Documentation

The department needs to document the connections that exist between buildings on both campuses.

Road map

There are three items on the LAN Connections road map.

Evaluate Network Drops\ Punch Panels

Many of the COS buildings and the network drops and patch panels within them are over two decades old. The communication infrastructure in these buildings needs to be evaluated to identify areas where cabling and/or punch panels need to be replaced.

Replace Multi-mode Fiber w\ Single-Mode

Over time, the College should replace older multi-mode fiber links with single-mode fiber.

New Lodge Building

The College is seeking to construct an additional lodge building. If such a project were launched, the LAN connections and internal wiring for this building would need to be designed and deployed.

WIRELESS NETWORK

The wireless network makes the College's internal network available to mobile devices such as laptops, tablets, and smart phones.

Accomplishments

There was one accomplishment in this area.

Wyebot Deployment

The College purchased an annual subscription to analytical services for wireless ecosystems from Wyebot. The department deployed three Wyebot devices around the Lodges and gather data to be analyzed and present recommendations to improve the existing wireless deployment in the Lodges.

Current Needs

There are three current needs in this area.

Upgrade Wireless Network in Lodges

Over the last few years, the expected service level of the WiFi network in the Lodges has increased without any discussion of the change or the provisioning of resources to meet the new expectations. When the WiFi network was first implemented in the Lodges, the intent was to provide the same level of service there that existed everywhere else on campus. If residents wanted a high-speed connection, it was recommended that they obtain that service through the cable provider. At some point, the College started listing free WiFi as one of the amenities in the Lodges, which created an implied but undefined level of service. It has been noted that students pay a lot to stay in the Lodges, which is certainly the case, but none of those funds are directed towards the WiFi network.

There are two challenges related to the fact that WiFi is transmitted as radio signals. Many of the construction materials used in the Lodges, such as cinder block walls, sound dampening tiles on the ceilings, and large wood support beams, resist radio signal penetration. This means that it is difficult to get a strong WiFi signal into individual rooms. What's more, new gaming systems can act as wireless access points; as a result, they can emit signals on the same frequency and channels as the College's WiFi network, which creates signal interference.

Finally, since WiFi was first implemented in the Lodges, there have been a couple of trends that have led to a significant increase in the use of the WiFi network to access the Internet. There has been a notable increase in the number of devices residents have that can connect via WiFi such as laptops, tablets, smartphones, and gaming consoles. While we don't know for sure, it is reasonable to estimate that each resident now has, on average, 3 devices to connect. With 72

rooms and 2 residents per room, this means that the WiFi network would have over 400 devices connected. There has also been a large increase in online gaming and content streaming. Restrictions associated with the pandemic have made this increase even steeper over the last year. These two trends have fueled ever-increasing demand and a corresponding rise in residents' service level expectations but nothing has been defined nor have additional resources been provided to meet the growing expectations.

Finally, with the pandemic, Wifi in the Lodges suddenly became critical for residents to participate in classes and do their coursework. As a result, what was primarily an issue that impacted residents' ability to obtain entertainment content suddenly became an issue that also impacted their ability to do academic work.

Consequently, the wireless network in the Lodges needs to be upgraded to meet the new service level expectations now and into the future.

Wireless System Refresh

The current wireless network infrastructure was purchased and deployed in the summer of 2017. The AP licenses will expire in June 2023. As a result, these licenses will need to be extended in FY22-23. In addition, Tech Services will need to evaluate the AP hardware to determine what when they will need to be replaced.

Develop Coverage Maps

Tech Services needs to create maps for both the Weed and Yreka campuses that indicate where wireless network coverage is provided and, by implication, where it is not. This map would become part of the Data Network SLA so that there is a formal understanding about where coverage can be expected.

Road Map

There is one item on the Wireless Network road map.

New Lodge Building

The College is seeking to construct an additional lodge building that would add approximately 350 additional residents. If such a project were launched, the wireless network would need to be extended to this building and scaled to provide the equivalent of a broadband connection to every resident in the building.

VIRTUAL PRIVATE NETWORKS

Virtual Private Networks (VPNs) allow the College to securely extend its internal network over a public network. This takes two forms. The most common is a client-server VPN in which a single computer connects to the College's internal network through the Internet. Another is a network-network VPN in which two networks create a private link over the Internet.

Accomplishments

There was one accomplishment in this area.

Retire Cisco AnyConnect

All users were migrated from the Cisco AnyConnect VPN to the PA Global Protect VPN so that the Cisco ASA firewall could be retired. (For more information, see the 'Firewall' section in the "Information Security" chapter.)

Current Needs

There are three current needs in this area.

Two-Factor User Authentication

Currently, users only need to provide a password to access the VPN. This makes the VPN vulnerable to dictionary-styled attacks. To strengthen security, the College needs to implement two-factor authentication for VPN access. In light of recent ransomware attacks, this is a critical need.

Workstation Authentication

Currently, users can access the VPN from any computer on which they have installed the VPN client software. This means that users can connect from computers that do not have the College's standard security settings and tools. This presents a significant security risk. To eliminate this risk, the College needs to add workstation authentication to the VPN so that only COS-issued systems can connect through the VPN.

Azure Cloud

As discussed in the "Infrastructure as a Service" section below, the College intends to migrate locally hosted servers to the MS Azure cloud. This will require establishing a network-to-network VPN between the COS network and the College's Microsoft Azure tenant.

Road Map

There are no items on the VPN roadmap.

ROUTING

Routing is the flow of network traffic between VLANs within the college's network as well as out to and in from the Internet.

Accomplishments

There was one accomplishment in this area.

Streamlined Architecture

The network was re-architected to eliminate a 'loop' in which traffic routed through the Internet would pass through the core switches twice.

Current Needs

There is one current need in this area.

Documentation

The department needs to document all of the existing VLANs as well as what devices perform layer-3 routing functions, where and what static routes have been defined, and what dynamic routing protocol(s) have been deployed.

Road Map

There is one item on the Routing road map.

Architecture Evaluation

Once the current routing architecture has been documented, it should be evaluated to determine what if any changes should be made to make improvements, including a reduction in the number of VLANs.

IP SERVICES

IP Services are the services that are needed to implement the TCP/IP protocol. Currently, the College uses the Domain Name System (DNS) to provide host name to IP address resolution both internally

and externally as well as the Dynamic Host Configuration Protocol (DHCP) to dynamically allocate IP addresses.

Accomplishments

There were two accomplishments in this area.

DNS Upgrade

The domain controllers that also act as DNS servers were upgraded from Windows 2016 to 2019.

DHCP Upgrade

DHCP services in both Weed and Yreka were migrated from domain controllers running Windows Server 2016 to stand-alone servers running Windows Server 2019 (COS-DHCP-WEED and COS-DHCP-YREKA), ensuring that upgrades to the domain will not disrupt DHCP services.

Current Needs

There are no current needs in this area.

Road Map

The only item on the road map is periodically upgrade the servers providing IP services to the current standard operating system.

DATA CENTERS

A data center is a room that is dedicated to housing deployed technological equipment. The College has three data centers: a server room and network communication room on the Weed Campus and a server room on the Yreka Campus. This sub-section focuses on power, climate control, and security for these data centers.

Accomplishments

There was one accomplishment in this area.

Data Center UPS Refresh

The UPS in the server and network communication racks in the Weed Data Center and the UPS in the server rack in the Yreka Data Center were replaced. In addition, a data center-grade UPS was installed in the Network Communications Room in the DLC.

Current Needs

There are three current needs in this area.

Strengthen Network Communications Room Security

Currently, the Network Communications Room can be accessed by anyone with the general access key (#45). Access to this room should be limited to those with a more restricted key (#49).

Complete Documentation

The department needs to complete documentation of the climate control systems and UPSs in the data center.

Road Map

Two items are currently on the Data Center road map.

Environmental Monitoring

The department needs to explore better methods for monitoring and notifying the environment (such as temperature and humidity) in its data centers.

Dedicated Climate Control in Network Communications Room

Currently, climate control is provided to the Network Communications Room (DLC7) with the same system that is used for the rest of the building. The department should perform a cost-benefit analysis to determine if a dedicated climate control system is needed.

Once the documentation has been completed, the road map will be expanded.

Servers

This section enumerates the accomplishments, details the current needs, and lays out the road map for the College's servers, both physical and virtual.

WINDOWS SERVER OPERATING SYSTEMS

The department has established Microsoft Server as the College's standard server operating system (2019 is the current standard version). Other server operating systems, such as Linux, are only used when (1) Windows Server cannot be used and (2) support for the server operating system is provided by an external vendor.

Accomplishments

There was one accomplishment in this area.

Retired Windows 2008 Operating System

All servers running Windows Server 2008 were either upgraded or removed from the environment.

Current Needs

There are two current needs in this area:

Retire Windows 2003 Operating System

The College currently has four servers running the Windows Server 2003 operating system that runs the College's legacy Student Information System. This OS is reached end of life 7/14/15 and is no longer supported by Microsoft. Consequently, Microsoft no longer makes security updates for these OSs, making their use a significant security risk. To eliminate this risk, the department needs to retire all servers running these OSs. <Enumerate servers?>

Retire Windows Server 2012 Servers

Recently, the department retired or upgraded 12 servers running Windows Server 2012 but the College still has 13 servers running this OS. Microsoft has scheduled this OS's end-of-life for 10/10/23. The department needs to retire or upgrade these servers before this date.

Road Map

There are three items on the Server Operating System road map:

Retire Windows Server 2016

The College needs to transition the process of upgrading its server operating systems from the end of the OS lifecycle towards the beginning. The College currently has 16 servers running the Windows Server 2016 operating system. Microsoft has scheduled this OS's end-of-life date 01/27/27. To start this transition, the department will need to develop plans to upgrade servers that are currently running 2016 over the next three to five years. Ideally, the department will find opportunities to upgrade this OS earlier than this.

Define COS Server Standard

The department needs to develop a “COS Server Standard” document that defines both the hardware and software standard for all COS servers. Hardware standards will be applied when procuring new servers. Software standards will be applied when deploying new servers and will be enforced throughout the servers’ lifecycle. This standard will be regularly updated as technology changes.

Create COS Server Standard Implementation System

Once the standard is defined, the department needs to create a system that will automatically deploy, update, and continually enforce the COS Server standard on all Windows servers.

VIRTUALIZATION

The College has two virtualization environments. The primary virtualization environment, which hosts most of the College’s virtual servers, utilizes the Windows HyperV hypervisor. This environment consists primarily of four servers combined into a cluster that run on the Nutanix hyperconverged device. It is supplemented by one stand-alone HyperV server in Weed and another in Yreka. The other virtualization environment, which hosts servers needed for the telecommunication environment, utilizes the VMWare ESX hypervisor.

Accomplishments

There was one accomplishment in this area.

HyperV Hosts Upgrade

The stand-alone HyperV hosts (WVMHOST-01 and YVMHOST-01) were upgraded from Windows Server 2012 to 2019. The HyperV hosts on the Nutanix hyperconverged device were upgraded from Windows 2012 to 2016. These were not upgraded to 2019 due to possible compatibility issues and intent to retire this device in FY22-23.

Current Needs

There is one current need in this area.

Documentation

The department needs to document both virtualization environments and then perform a service evaluation to determine where improvements can be made.

Road Map

The roadmap will be produced by the service evaluation discussed above.

STAND-ALONE SERVERS

Stand-alone servers are physical servers that run a single operating system, applications, and store data locally.

Accomplishments

No work was performed in this area.

Current Needs

There is one current need in this area.

Documentation

The department needs to document all stand-alone servers and then perform a service evaluation to determine where improvements can be made. Specifically, a determination needs to be made if there is a legitimate business or technical reason such servers cannot be virtualized.

Road Map

The roadmap will be produced by the service evaluation discussed above.

HYPER-CONVERGED TECHNOLOGY

The College has deployed a Dell Nutanix device, which combines server and storage hardware into a single device. This device runs the College's primary virtual server environment.

Accomplishments

There were two accomplishments in this area.

AOS Upgrade

The Acropolis Operating System (AOS) that manages the Nutanix device was upgraded to the latest version.

Warranty and Support Extended

The warranty and support for the Nutanix device was extended so that it expires March 31, 2023. In FY21-22, the College will need to extend this for another year.

Current Needs

There is one current need in this area.

Retire Existing Nutanix Device

The warranty and support for the current Nutanix device will expire March 31, 2023. The device will reach end-of-life shortly thereafter so extending the warranty and support for another year is not an option. Consequently, the College will need to either replace the device or migrate the virtual servers on this device to an Infrastructure-as-a-Service cloud environment. (For further discussion, see the Infrastructure-as-a-Service section below.) Once retired from production, the device may be used to create a test environment.

Road Map

If the device is replaced by IaaS, this technology will be retired. If the device is replaced, the road map will be to maintain the device until the end of its lifecycle when the College will again need to decide whether to replace it or move to IaaS.

Information Security

This section addresses various technologies that are used to secure the College's information systems.

FIREWALL

The College has a single firewall deployed to protect the College's internal network from threats on the Internet.

Accomplishments

There was one accomplishment in this area.

Cisco ASA Retired

While the role of the firewall had already been switched from the Cisco ASA to PA-3260, the Cisco ASA was still deployed to provide VPN services. Once clients were migrated from the Cisco AnyConnect VPN to Palo Alto GlobalProtect VPN, the Cisco ASA firewall was retired.

Current Needs

There are no current needs in this area.

Documentation

The existing firewall configuration, particularly open ports, Network Address Translations (NATs), and the VPN with the Ellucian cloud, need to be documented.

Road Map

There is one item on the Firewall roadmap.

Intrusion Testing

The College needs to establish a program to perform periodic intrusion testing to detect any unnecessary access through the firewall.

PASSWORD PROTECTION

The department has dozens of user account\password combinations that it uses as part of its regular operations. Because these accounts often need to be used by multiple individuals, the department needs to be able to share this information between staff members. On the other hand, because these accounts are critical to the department's operations, it is essential that this information is fully secured.

Accomplishments

There were no accomplishments in this area.

Current Needs

There is one current need in this area.

Implement Password Vault

The department currently stores passwords for its various accounts in an Excel spreadsheet. The department needs to replace this spreadsheet with an application

Road Map

There is one item on the road map.

Explore Expanding Use of Password Vault

The department will explore expanding use of the password vault solution to the entire College.

ENDPOINT PROTECTION

Endpoint Protection involves securing endpoints within an Information Security system – such as desktops, laptops, and mobile devices – from malicious software.

Accomplishments

No work was performed in this area.

Current Needs

There is one current need in this area.

Perform Evaluation

The College currently utilizes Windows Defender, an application included within the Microsoft Windows operating system, for endpoint protection. The College needs to evaluate the effectiveness of this solution to determine if an additional solution is needed.

Road Map

The Endpoint Protection road map will be defined after the evaluation mentioned above.

MONITORING AND SECURITY INFORMATION AND EVENT MANAGEMENT (SIEM)

The College uses Solarwinds software to monitor activity on the College's data network and to view activity logs from various nodes on the network.

Accomplishments

There were no accomplishments in this area.

Current Needs

There is one current need in this area.

Evaluate No-cost Solutions

In light of significant budget constraints, the department needs to evaluate shareware solutions that may be able to provide similar capabilities free of cost.

Road Map

A road map will be set once a determination is made whether to move to shareware solutions.

PERSONAL INFORMATION SECURITY PROGRAM

The College of the Siskiyous (COS) values the privacy of its students, faculty, staff and all with whom it interacts and has implemented a "Personal Information Security Program" to ensure that personally identifiable information (PII) is properly safeguarded, whether stored physically or digitally.

Accomplishments

There was one accomplishment in this area.

Update COS Personal Information Security Program

As required by the Gramm-Leach Bliley Act (GLBA), the "COS Personal Information Security Program" document was updated for the 2021-2022 academic year and provided to external auditors to indicate compliance.

Current Needs and Road Map

The aforementioned document sets forth an Action Plan which includes the 'Current Needs' of this program. Technology-related components of the plan are incorporated throughout this document. Non-technological components are mentioned here.

Annual Cyber Security Training

A training program needs to be implemented to require all staff and faculty to receive training once a year on the proper handling of PII as well as cyber security in general. The content of this training should be updated each year to include the latest threats and best practices. This training should also include remedial training that will be required whenever a faculty or staff member has committed a serious breach of existing policies and procedures.

Phishing Testing

COS needs to implement a plan to periodically send phishing tests to users to certify that users are following best practices and not falling prey to phishing attacks. Those who fail phishing tests would be required to receive the remedial training mentioned above.

Road Map

The aforementioned document sets forth an Action Plan which includes the 'Road Map' of this program. Technology-related components of the plan are incorporated throughout this document. Non-technological components are mentioned here.

Incident Response Plan

The Technology Services department needs to develop an incident response plan to respond to cyber security incidents.

Data Loss Protection

Data Loss Prevention (DLP) includes identifying confidential electronic data, tracking the flow of such data through the network, and preventing its unauthorized disclosure. In FY18-19, the College purchased ForcePoint software to provide DLP and began to implement it. Unfortunately, budget reductions that started in FY19-20 prevented the College from continuing to license the software and its implementation was not completed.

The department needs to identify a less costly DLP solution and procure both initial and recurring funding for this solution. This includes researching what may already be available through Microsoft Office365 and what may be offered by the California Community College Chancellor's Office's (CCCCO's) Technology Center.

Tabletop Exercise

The Technology Services department will periodically perform tabletop exercises to practice and be better prepared for a cyber security incident.

User Account Management

This section discusses technologies associated with identity management and authentication.

ACTIVE DIRECTORY

The College uses Microsoft Active Directory (AD), both local and Azure, as its primary identity management and authentication system.

Accomplishments

There was one accomplishment in this area.

INS Domain Retired

The INS child domain that previously hosted student accounts was retired both locally and in Azure AD.

Active Directory Upgrade

The local Active Directory domain controllers were upgraded from Windows Server 2012 to Windows Server 2019 and the forest and domain levels were raised accordingly.

Current Needs

There is one current need in this area.

Global Address List segregation

With both employees and students in the same Azure AD domain, the default Global Address List (GAL) includes both, which presents a large list and increase the likelihood of accidentally selecting a wrong recipient. The department needs to determine how to segregate the GAL to address these issues.

Road Map

There are two items on the Active Directory road map.

Regular Active Directory Upgrades

The department needs to regularly upgrade the Active Directory forest\domain so that it corresponds to the current operating system standard.

Separate Student Domain

The department needs to explore the possible benefits of developing a separate Azure AD domain for student accounts.

PROVISIONING\DE-PROVISIONING PROCESS

This section discusses the technology and business processes used to create and retire user accounts for both employees and students.

Accomplishments

There were no accomplishments in this area.

Current Needs

There is one current need in this area.

Develop and Document a Formal Process

The department needs to work with the Human Resources department to develop and document a formal process for provisioning and de-provisioning accounts for employees. This process will include on-boarding new employees from a technological perspective.

Road Map

There is one item on the road map.

Retire Scripting Process

While the scripting process mentioned above allows the department to automatically create accounts in Azure AD, it must be maintained by the department and is vulnerable to changes in Microsoft's PowerShell scripting commands and syntax. Consequently, the department should monitor BEIS ADAP development to see if it adds the ability to create accounts in Azure AD.

Infrastructure-as-a-Service (IaaS)

Infrastructure-as-a-Service (IaaS) allows an organization to move its technological infrastructure, such as servers and storage, from local hardware to a vendor's cloud (i.e. Internet presence).

AZURE

Microsoft Azure is Microsoft's IaaS offering.

Accomplishments

The College does not currently utilize Azure for IaaS so, naturally, there are no accomplishments in this area.

Current Need

There is one significant current need in this area.

Migrate to MS Azure for IaaS

As discussed in the 'Servers & Storage' section above, the hyper-converged device currently used to host the College's primary virtualization environment will no longer be warranted after March 31, 2022 and will reach end-of-life shortly thereafter. While the College could simply upgrade to a newer device, the department believes it would be better to migrate the servers to the cloud through IaaS.

There are several benefits that the College could receive by moving its servers from a locally hosted device to the cloud. One is the reduction of overall costs. The cost of multiple physical servers that must be replaced every five years is greater than the annual cost of IaaS hosting. What's more, overall power usage will decrease as the College no longer needs to run its own servers and less heat will be generated that will need to be cooled by the HVAC system. On a related note, the College's overall environmental impact will be lessened because cloud providers can use economy of scale to reduce overall power consumption.

Additional benefits include improved security and a greater ability to recover from disasters. Cloud providers provide additional security measures to prevent malware from affecting systems running in their environment that are not available at the College. Also, because these servers run in the cloud, they can be available even if there is a disaster, such as a fire, that makes the campus inaccessible.

One significant change that this migration will bring is that a capital expenditure (CAPEX) will become an operating expenditure (OPEX) because the College would no longer purchase capital assets (i.e. servers) but rather pay monthly bills for IaaS services. In most situations, this would be considered yet another benefit because capital expenditures either significantly disrupt cash flow or incur additional financing costs. For the College, however, this means that expenditures that have traditionally been funded by grants would most likely be funded through the general fund, the College's most limited funding source. Consequently, the department will explore ways to fund IaaS services through grants.

The biggest challenge the department will face is that a new set of skills will be needed by Technology Services staff. These skills will be needed to implement the original migration and to administer servers once they are in an IaaS environment. Consequently, the department will need to engage consultants to assist in the migration and need to provide training to the Infrastructure Services staff.

The department has selected Microsoft Azure as the IaaS provider for two reasons. First, the College can leverage its existing relationship to obtain needed resources. Specifically, Microsoft offers FastTrack consulting to assist in designing the new IaaS environment and executing the migration. Second, the College can take advantage of the California Community College's existing Microsoft agreement to get the best pricing and build the costs into the COS' existing Campus Agreement. What's more, it may be possible to induce Microsoft to include training as part of this agreement.

Road Map

A road map will be developed after the migration to Azure has been completed.

AMAZON WEB SERVICES

The College currently utilizes Amazon Web Services (AWS) to provide IaaS for the College's public web site.

Accomplishments

No work was performed in this area.

Current Needs

There is one current need in this area.

Documentation

The existing AWS implementation need to be documented and evaluated.

Road Map

If, as discussed above, the College decides to implement IaaS through Microsoft Azure, it should migrate the web server from AWS to Azure.

Business Continuity\Disaster Recovery

This section focuses on the technology and business processes designed to make the College's information systems resilient in the face of disruptions and disasters.

DATA BACKUP\RECOVERY

Data backup is performed so that, if data is accidentally lost or damaged, it can be restored.

Accomplishments

There was one accomplishment in this area.

Full Cloud-based Backup

To improve the College's ability to recover lost or damaged data (particularly ransomware), all backups have been placed in the cloud, specifically to a location maintained by AMS.NET.

Current Needs

There is one current need in this area.

Identify Requirements

The College needs to define the requirements for archiving data so that the department can configure a data backup routine with the appropriate restore points.

Road Map

There is one item on the Data Backup\Recovery road map.

Upgrade for New IaaS Environment

After the College migrates to IaaS (see the 'Infrastructure as a Service' section above), the department will need to upgrade its data backup and recovery processes to reflect the new architecture.

BUSINESS CONTINUITY

Business continuity is the ability of a technological infrastructure to experience component failures and still be able support business process.

Accomplishments

No work was performed in this area.

Current Needs

There is one current need in this area.

Identify Single Points of Failure

The department needs to evaluate the current information system architectures to identify individual components that, if they fail, would result in the failure of critical information systems.

Road Map

There is one item on the Business Continuity road map.

Eliminate Single Points of Failure

The department needs to develop a plan to, wherever possible, eliminate single points-of-failure to improve the College's business continuity.

DISASTER RECOVERY

Disaster recovery is the ability of a technological infrastructure to restore services after they have been interrupted by a disaster.

Accomplishments

No work is accomplished in this area.

Current Needs

There are two current needs in this area.

Identify and Prioritize Critical Systems

The department needs to work with the College to identify critical systems. These systems then need to be prioritized in relation to one another to determine possible recovery order.

Enumerate Potential Disasters and Probability

The department needs to enumerate potential disasters that could adversely impact the College's information systems and then determine the probability of each. This information will be used to determine which disasters should be the focus of disaster recovery.

Road Map

There is one item on the Disaster Recovery road map.

Develop Disaster Recovery Plan

The College needs to develop a formal Disaster Recovery Plan. As a part of that plan, the department needs to develop a plan to recover information systems to support the College's critical operations after a disaster.