

Chabot-Las Positas Community College District Technology Plan 2021-2026

October 21, 2022

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Introduction

The Chabot-Las Positas Community College District (CLPCCD) Technology Plan 2021-2026 addresses District-wide technology planning and ongoing support to further the mission and strategic direction of CLPCCD. The Technology Plan reflects the strategic directions in the CLPCCD District-wide Strategic Plan 2021-2026 (DSP) and serves as a guide for the allocation and use of CLPCCD technology resources.

CLPCCD Mission

The Chabot-Las Positas Community College District offers innovative educational opportunities and support services to prepare students to succeed in a diverse global society by challenging them to think critically, to engage socially, and to acquire workplace knowledge and educational skills.

CLPCCD Technology Vision

The DSP has served as a guide to the technology planning process and the recently completed information technology (IT) assessment of the CLPCCD technology environment. The technology initiatives identified in this plan are designed to promote the strategic directions detailed in the DSP (see Appendix I) and support the ongoing efforts of CLPCCD to sustain a highly functional and secure technology environment including the enhancements recommended in the IT assessment.

CLPCCD Technology Environment

The District Chief Technology Officer (CTO) leads Information Technology Services (ITS), which provides several IT services for the District, Chabot College (Chabot) and Las Positas College (LPC). Specifically, ITS is responsible for the physical infrastructure supporting technology, the data network, voice systems, cellular distributed antenna systems (DAS), servers and storage for enterprise applications, and enterprise applications. District ITS works closely with the Managers of College Technology Services at Chabot and LPC who report to the District CTO. The CTO co-chairs the Technology Coordinating Committee (TCC), which makes recommendations to the CLPCCD Planning and Budget Committee for District-wide support for technology planning and facilitates the coordination, alignment, and integration of college technology planning with District-wide technology planning and resources allocation.

Technology Plan Development Process

CLPCCD engaged the IT consulting firm WTC Consulting Inc. (WTC) to conduct an IT assessment of the District, Chabot, and LPC IT environments and assist with the development of the technology plans. As part of the assessment process, WTC conducted multiple interviews with the ITS managers and staff as well as interviews with individual faculty and staff, and provided students, faculty, and staff the opportunity to respond to short online surveys. The District IT Assessment Report appears in Appendix II.

This plan is intended to be a living document. Projects will be identified and completed throughout the life of the plan. The plan will be regularly reviewed and updated to account for the ongoing nature of technology operations.

2021-2026 Technology Initiatives and Projects

In this section, we describe five technology initiatives and related ongoing, in progress, or planned projects. For each project within an initiative, we indicate the role of District, the role of the colleges, responsibilities related to these roles, and the impact on students, faculty, and staff.

- Initiative #1: Maintain a Current Technical Environment – Ensure that students, faculty, and staff have access to sufficient and properly configured computing resources, effective online resources, and a highly available and secure network in support of, diversity, equity, inclusion, accessibility, teaching, student support and administrative services.
- Initiative #2: Improve the Student Experience – Provide students with easily accessible tools that enable them to effectively use online student services such as advising appointments, course registration, and tracking degree progress to promote diversity, equity, inclusion and accessibility.
- Initiative #3: Advance Teaching and Learning – Use technology to enable the District to continually enhance a diverse, equitable, inclusive and accessible student learning environment by supporting faculty in their efforts to integrate innovative pedagogical methods to address a wide array of learning styles.

- Initiative #4: Improve Operational Efficiency – On a continuous basis, evaluate and improve technology planning and decision-making processes, enhance training for faculty and staff, and use technology that supports diversity, equity, inclusion and accessibility to reduce the reliance on paper and automate manual tasks.
- Initiative #5: Continually Enhance Data Security – Evaluate the College’s security posture on a continuous basis, work to mitigate vulnerabilities and reduce security risks, and promote security awareness among students, faculty, and staff through ongoing training that minimizes potential harm in our diverse, equitable, inclusive and accessible community.

Initiative #1: Maintain a Current Technical Environment

Project: Life-cycle Management of Staff Systems – Continue to refresh staff systems according to the agreed-upon life cycle.

District Role: Conduct an annual review of staff system inventory to identify systems to be replaced, create a replacement plan and schedule, and execute the replacement plan. Primary responsibility: District ITS.

Impact: Ensure that staff have access to up-to-date systems with supported operating systems.

Expected Completion: Ongoing

Project: Life-cycle Management of Servers – Upgrade District servers and add server security enhancements.

District Role: Upgrade servers and enhance server security. Primary responsibility: District IT System Support.

Impact: Ensure the server infrastructure reflects current technology, servers are under warranty and running supported operating systems, and servers are configured with enhanced security features.

Expected Completion: Ongoing

Project: Migration of Faculty and Staff email to Office 365 (O365) – Initiated a project in September 2020 in response to problems with the District on-premises Exchange servers.

College Role: Participated in the weekly meetings of the Migration Team.
Investigated and resolved user issues during the migration. Primary responsibility: Chabot Technology Services and LPC Technology Services.

District Role: ITS staff, Chabot Manager of College Technology Services, and LPC Manager of College Technology Services worked with a consultant from SHI International to conduct the migration of O365 and are currently in the final phase of the migration. Primary Responsibility: District ITS.

Impact: Improved reliability in email services for faculty and staff with additional functions and features including integrated online storage.

Expected Completion: October – November 2022

Project: Single Sign On (SSO)– Implement the OKTA identity and access management system to support single sign on that will allow each user to access networked resources (e.g. Class-Web, Zonemail) with a single set of login credentials.

College Role: Investigate and resolve user issues with SSO. Primary responsibility: Chabot Technology Services and LPC Technology Services.

District Role: Implement system and provide ongoing technical support. Primary responsibility: District ITS.

Impact: Each student, faculty, and staff member will be able to access computing resources with their single set of login credentials.

Expected Completion Date: November 2022

Project: Integrate Multifactor Authentication with O365 – Add a multifactor authentication (MFA) requirement for access to O365.

District Role: Integrate MFA with O365 and provide ongoing technical support. Primary responsibility: District ITS.

Impact: Enhance security of CLPCCD O365 accounts.

Expected Completion Date: Spring 2023

Project: Integrate Multifactor Authentication with VPN – Add a multifactor authentication (MFA) requirement for access to the VPN.

District Role: Integrate MFA with the VPN and provide ongoing technical support.
Primary responsibility: District ITS.

Impact: Enhance security of CLPCCD VPN accounts.

Expected Completion Date: August 2022

Project: Distributed antenna systems (DAS) – The District has been expanding cellular coverage by installing DAS for the District and for each college. A system includes a headend used to bring cellular carriers into campus and then the signal is distributed over fiber optic and Ethernet cabling to DAS antennas within buildings. The District and LPC headends are in production. The Chabot headend is in development.

College Role: Coordinate with the District staff managing the system to investigate and resolve issues. Primary responsibility: Chabot Technology Services and LPC Technology Services.

District Role: Oversee preparation of physical infrastructure, system installation, and ongoing system support for new and existing construction. Primary responsibility: Manager, ITS Bond Projects.

Impact: Provide improved cellular reception within buildings for students, faculty, and staff.

Expected Completion: Ongoing

Project: Core Switch Upgrade – Migrate the network core equipment from older switches to more contemporary switches as part of life-cycle management of the network equipment.

District Role: Configure and install core network equipment. Primary responsibility: Manager, ITS Bond Projects.

Impact: Ensure core network equipment is supported by the vendor and under maintenance with an appropriate coverage and response level. A network diagram appears in Appendix III.

Expected Completion: January 2024

Project: Complete Migration to Banner 9 – Migrate the last remaining custom, local Banner 8 forms in use to Banner 9.

College Role: Provide input on creation of the new forms, adopt the new forms, and ensure that staff receive the necessary training on using the new forms.
Primary responsibility: Chabot Director of Admissions & Records, Chabot Director of Financial Aid, LPC Director of Admissions & Records, and LPC Director of Financial Aid.

District Role: Work with Chabot-LPC-District Team established to create new forms on the structure of the new forms and implement the new forms in Banner 9. Primary responsibility: District ITS Banner Support.

Impact: Increase the efficiency of the college staff members who currently are working in both Banner 8 and Banner 9.

Expected Completion: April 2023

Project: AIX Infrastructure – Upgrade AIX to Version 7.2 together with related firmware.

District Role: Complete required testing prior to upgrade, identify a window when Banner system can be offline, communicate upgrade window to campus community, and apply the upgrade. Primary responsibility: District ITS Systems Support.

Impact: Improve system performance and configure the AIX platform with software and firmware versions required to support the upgrade to Oracle 9C.

Expected Completion: October – November 2022

Project: Upgrade to Oracle 9C – Upgrade the Oracle database management platform that supports the Banner databases.

District Role: Complete required testing prior to upgrade, identify a window when Banner system can be offline, communicate upgrade window to campus community, and apply the upgrade. Primary responsibility: District ITS Systems Support.

Impact: Maintain Banner certification and Oracle support.

Expected Completion: February – April 2023

Initiative #2: Improve the Student Experience

Project: Ellucian CRM Advise – Integrate system with existing Banner system to enhance student success and retention strategies.

College Role: Engage student services areas in redesigning their work processes and workflows to effectively integrate the functionality and features of the system. Primary responsibility: Chabot Student Services Leadership and LPC Student Services Leadership.

District Role: Implement system and provide ongoing technical support. Primary responsibility: District ITS Banner Support.

Impact: Enable colleges to strengthen student success and retention strategies, customize communication and outreach to students, track student performance and support timely intervention efforts, and measure performance and retention results.

Expected Completion: December 2022

Project: Implement Ellucian CRM Recruit – Integrate system with existing Banner system to enhance student recruitment and admissions processes.

College Role: Engage recruitment and admissions staff in redesigning their work processes and workflows to effectively integrate the functionality and features of the system. Primary responsibility: Chabot Student Services Leadership and LPC Student Services Leadership.

District Role: Implement system and provide ongoing technical support. Primary responsibility: District ITS Banner Support.

Impact: Enable colleges to streamline and enhance their recruitment and admissions processes by automating previously manual tasks and incorporating effective reporting and measurement tools.

Expected Completion: December 2022

Project: Ellucian Degree Works – Migrate the existing Chabot and LPC instances of Degree Works to a single instance to enable integration with CRM Advise.

College Role: Work within a Chabot-LPC-District team to resolve the differences between the two existing instances of Degree Works and migrate to a single instance. Primary responsibility: Chabot Student Services Leadership and LPC Student Services Leadership.

District Role: Implement system and provide ongoing technical support. Primary responsibility: District ITS Banner Support.

Impact: Enable integration of Degree Works with CRM Advise.

Expected Completion: May 2023

Project: Upgrade Self-Service Banner (SSB) – Upgrade Self-Service Banner to Banner 9 SSB, including the student self-service ClassWeb.

College Role: Ensure college staff who work with students during the registration process are provided the training needed to assist students who may have questions on using the new ClassWeb interface. Primary responsibility: Chabot Student Services Leadership and LPC Student Services Leadership.

District Role: Implement system and provide ongoing technical support. Primary responsibility: District ITS Banner Support.

Impact: Provide students with a substantially improved and user-friendly interface for the registration process.

Expected Completion: May 2023

Project: Portal – Implement Ellucian Experience Portal with integration of Okta SSO to provide students with a single-entry point to their general online hub including ClassWeb and Zonemail.

College Role: Ensure that college staff working with students are provided training on the portal so they are prepared to assist students who may have questions on using the portal. Primary responsibility: Chabot Student Services Leadership and LPC Student Services Leadership.

District Role: Implement the Ellucian Experience Portal and provide ongoing technical support. Primary responsibility: District ITS Banner Support.

Impact: Enhance the experience of students when accessing and using their online resources including course registration.

Expected Completion: November 22 (Revision 1); March 2023 (Revision 2)

Project: Ad Astra Course Scheduling – Implement Ad Astra course scheduling software to integrate data such as past enrollment patterns and student pathway progress into the course schedule planning process to improve the match between courses offered and student needs.

College Role: Integrate use of the Ad Astra software into the course scheduling process. Primary responsibility: Chabot Academic Services Leadership and LPC Academic Services Leadership.

District Role: Implement the Ad Astra software and provide ongoing technical support. Primary responsibility: District ITS Banner Support.

Impact: Improve the match between courses offered and the courses students need to make progress in their academic programs.

Expected Completion: August 2022

Project: Analyze Student Registration Processes and Technologies – Engage an external consulting firm to assist the District, Chabot, and LPC with conducting an end-to-end review of registration processes.

College Role: Work within a District-Chabot-LPC-consultant team to complete an end-to-end review of registration processes. Primary responsibility: Chabot Student Services Leadership and LPC Student Services Leadership.

District Role: Work within a District-Chabot-LPC team to complete an end-to-end review of registration processes. Primary responsibility: District ITS Banner Support.

Impact: Identify process and technology changes and upgrades that enhance the student experience in and level of satisfaction with the registration process.

Expected Completion: January 2023

Initiative #3: Advance Teaching and Learning

Project: Hybrid-Flexible (HyFlex) Classrooms – Configure classrooms with the technology required to support HyFlex courses that integrate in-class instruction and online a/synchronous video sessions.

College Role: Participate on the HyFlex Committee to address classroom design District wide, work internally to determine the subset of classrooms to configure to support HyFlex instruction, configure the classroom technology, and provide training for faculty to teach in HyFlex mode. Primary responsibility: College Technology Committees, Chabot Technology Services, and LPC Technology Services.

District Role: Coordinate a District-wide HyFlex Committee with leadership from the Vice Chancellor for Educational Services & Student Success and faculty membership from both colleges to address the classroom design for HyFlex courses. Primary Responsibility: Vice Chancellor for Educational Services & Student Success.

Impact: Provide students with the option to either attend class in person or participate remotely depending on their circumstances.

Expected Completion: Ongoing

Project: East Bay College Agile Network (EBCAN) Partnership – Increase student-focused equity pathways and adopt an innovative model that increases certificate and degree attainment for students across all three campuses (Las Positas, Chabot and Cal State East Bay).

College Role: Provide list of technology needs and specifications to define the solutions needed in support of the program goals and objectives. Primary responsibility: Chabot Academic Services Leadership and LPC Academic Services Leadership.

Impact: Remove barriers and knowledge gaps for students seeking transfer to and from CSU East Bay.

Expected Completion: Ongoing

Project: CVC-OEI Home/Teaching College – Implement system integration to allow students from other colleges to attend Chabot and Las Positas online courses as well as allowing Chabot and Las Positas students to attend online courses from other colleges.

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College Role: Provide resources (human and other) to support the integration through knowledge sharing and testing. Primary responsibility: Chabot Academic Services Leadership and LPC Academic Services Leadership.

District Role: Work with the CVC-OEI project team to implement required software and practices to share registration and other student information.

Impact: Comply with state mandates while improving enrollment, scheduling efficiency and student success.

Expected Completion: Spring 2023

Initiative #4: Improve Operational Efficiency

Project: Augment the District IT Governance structure for Prioritizing IT Enhancements

– Restructure and expand the District IT governance structure to include the following roles and responsibilities:

- The Chancellor’s Senior Leadership Team (SLT) will be responsible for final prioritization of IT enhancements and related communication to the District faculty and staff.
- A joint group of Chabot and LPC Vice Presidents will be responsible for evaluating and recommending prioritization of IT enhancements to the Chancellor’s Senior Leadership Team. As part of the evaluation and prioritization process, the joint group will identify at least the following related requirements:
 - College staff resources.
 - Other college resources.
 - College work process development.
 - College staff education and training.
- The Technology Coordinating Committee (TCC) will make recommendations to the joint group of Chabot and LPC Vice Presidents regarding prioritization of IT enhancements. See Appendix IV for the TCC charter.
- The CTO will work with ITS staff to identify ITS resource requirements for the IT enhancements and what ITS staff allocation is feasible.

College Role: Participate in the District IT governance evaluation and prioritization process. Primary Responsibility: Chabot Vice Presidents and LPC Vice Presidents.

District Role: Facilitate and coordinate restructuring and expansion of the District IT governance structure. Primary Responsibility: Designated members of the District Senior Leadership Team.

Impact: Involve the District, Chabot, and LPC leadership as active participants in reaching a consensus regarding prioritization of enterprise IT projects as well as identifying associated work process development, resource, education, and training requirements.

Expected Completion Date: May 2023

Project: District-wide Vaccine Mandate – Provide a system to enable students to upload their proof of vaccination and allow the District to track vaccination status and incorporate compliance to the vaccine mandate into the registration requirements process.

College Role: Serve as a point of first contact for students who cannot register due to vaccine card issues. Primary Responsibility: Chabot Student Services Leadership and LPC Student Services.

District Role: Implement the vaccine mandate system and provide ongoing technical support. Primary Responsibility: District ITS.

Impact: Provide students with an efficient process to upload their proof of vaccination and integrate their compliance with the registration process.

Expected Completion: Ongoing

Project: Update Information Technology Total Cost of Ownership (TCO) Plan – Update the 2017 Information Technology TCO plan (see Appendix V) based on the Gartner model using the IT Key Metrics Data (ITKMD) to reflect current infrastructure and operational costs and recommended staffing levels.

College Role: Perform analysis to update the College's information technology TCO. Primary Responsibility: Manager of College Technology Services

District Role: Perform analysis to update the College's information technology TCO. Primary Responsibility: Chief Technology Officer

Impact: Updated information to use for information technology planning and budgeting.

Expected Completion: May 2023

Project: Five-year “Look Ahead” Model – Build a five-year “look ahead” model for software applications supported throughout the District to identify both potential spending increases and opportunities to cut costs.

College Role: Conduct a College-wide review of existing software applications in use as well as anticipated changes that may require the purchase of new or replacement software applications as part of the College’s strategic technology planning process. Primary Responsibility: Manager of College Technology Services.

District Role: Conduct a District-wide review of existing software applications in use as well as anticipated changes that may require the purchase of new or replacement software applications. Establish an annual review to update the “look ahead” model. Primary Responsibility: District ITS.

Impact: Will have a five-year roadmap of anticipated software application costs.

Expected Completion: May 2023

Project: Training Materials for New Faculty and Staff – Work with Chabot and LPC to develop shared training materials for new faculty and staff such as online videos.

College Role: Establish a team to work jointly with District to develop shared technology training materials for new faculty and staff, supplement shared training materials with college-specific training materials, and incorporate training requirements into the onboarding process for new faculty and staff. Primary Responsibility: Chabot College Leadership and LPC College Leadership.

District Role: Establish a team to work jointly with Chabot and LPC to develop shared technology training materials for new faculty and staff, supplement shared training materials with District-specific training materials, and incorporate training requirements into the onboarding process for new staff. Primary Responsibility: District ITS.

Impact: Technology training for new faculty and staff will facilitate their access and use of campus technology and reduce the number of requests for one-on-one assistance.

Expected Completion: May 2023

Project: Zonemail Storage Requirements – Implement the new Google limitation on the amount of free storage (15GB) that can be used by an account including Google Photos and Google Drive.

District Role: Implement the new free storage limitation on student Google-based Zonemail accounts. Primary Responsibility: District ITS.

Impact: Brings the District into compliance with Google’s free data storage limit of 15GB.

Expected Completion: December 2022

Project: Online Forms – Implement online form tools to facilitate workflow and completion of online forms and electronic signatures.

College Role: Help identify high value targets for use with Adobe and adopt solutions as they are available. Primary Responsibility: Chabot College Leadership and LPC College Leadership.

District Role: Develop and deploy Adobe Sign forms as agreed upon with the colleges. Primary Responsibility: District ITS.

Impact: Improve efficiency and time to complete common forms currently handled and routed in hardcopy.

Expected Initiation: October 2022

Project: Implement Social Media Procedure – Create organizational structures and processes in support of Administrative Procedure 3725 (see Appendix VI) allowing the District, Chabot, and LPC to manage social media posts more effectively with respect to content, accessibility, and risk.

College Role: Work with District ITS, Public Relations, Marketing and Government Relations departments to identify social media channels, accounts, and account owners. Attend relevant social media training and professional development opportunities. Primary Responsibility: Will be either Vice President for Academic Services or Vice President for Student Services at Chabot and LPC.

District Role: Work with college Public Relations, and Marketing and Government Relations departments to identify social media channels, accounts, and account owners. Attend relevant social media training and professional development opportunities. Primary Responsibility: Public Relations, Marketing, and Government Relations (PRMG).

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Impact: Enable colleges to comply with public records requests and district-wide administrative procedures.

Expected Initiation: December 2022

Initiative #5: Continually Enhance Data Security

Project: Security Awareness Program – Establish an ongoing security awareness program for faculty and staff that includes at least the following elements:

- Responsible user practices
- Protection of sensitive information
- Phishing and social engineering awareness
- Periodic simulated phishing campaigns

College Role: Help ensure compliance with participation requirements. Primary Responsibility: Chabot College Leadership and LPC College Leadership.

District Role: Identify and make available appropriate security awareness training to the college community. Primary Responsibility: District ITS.

Impact: Meets compliance goals for system security.

Expected Initiation: December 2022

Project: Acceptable Use Policies and Administrative Procedures (3720 and 3725) – Revise these policies and procedures to reflect the current range of technologies and incorporate relevant legal statutes. See Appendix VI.

College Role: Provide input on the changes to the policies and procedures. Primary Responsibility: Chabot College Leadership and LPC College Leadership and constituent groups.

District Role: Conduct review and update process consulting with appropriate groups and committees, create updated policies and procedures, and present to Board of Trustees for approval. Primary Responsibility: Chief Technology Officer.

Impact: Updated policies and procedures reflecting the current range of technologies and relevant legal statutes.

Date Completed: June 2022

Project: Office 365 Training – Provide Office 365 training to faculty and staff including encouraging the use of OneDrive as the preferred option for file storage.

College Role: Encourage faculty and staff participation in Office 365 training sessions. Primary Responsibility: Chabot College Leadership and LPC College Leadership.

District Role: Providing training sessions. Primary Responsibility: District ITS.

Impact: Improved data protection awareness among faculty and staff and increased use of OneDrive for data storage.

Expected Completion: Ongoing

Project: Server Hardening – As part of a broader program to enhance IT security, the District conducts a weekly vulnerability scan of District and college servers.

College Role: Investigate and resolve any issues discovered during the scan. Primary Responsibility: Chabot Technology Services and LPC Technology Services.

District Role: Investigate and resolve any issues discovered during the scan. Primary Responsibility: District ITS System Support.

Impact: Enhanced security of District and college servers to reduce the chances of a security breach and enable District and college staff to respond in a timely manner to resolving any issues found.

Expected Completion: Ongoing

Project: Cloud Storage for Server Backup System – Expand the Unitrends backup systems of non-Banner District servers and college servers at Chabot and LPC to include cloud-based storage.

College Role: Work with the District to develop and implement a plan and schedule for expanding the server backup system to include cloud-based storage. Primary Responsibility: Chabot Technology Services and LPC Technology Services.

District Role: Work with Chabot and LPC to develop and implement a plan and schedule for expanding the server backup system to include cloud-based storage. Primary Responsibility: District IT System Support.

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Impact: Remove the data loss risk of having only on-premises storage of server backups.

Expected Completion: January 2023

District Strategic Directions Mapped to 2021-2026 Technology Initiatives

Table I illustrates the mapping of the District Strategic Directions to the 2021-2026 technology initiatives.

Table I: Mapping of Strategic Directions to Technology Initiatives		
Strategic Direction	Strategic Direction Description	2021-2026 Technology Initiative
Educational Excellence	Increase CLPCCD’s reputation as an educational leader known for offering an outstanding student experience; excellence in teaching and learning; affordable, inclusive, and culturally relevant programs and pathways leading to academic achievement; and preparing students to compete and succeed in a sustainable global environment.	<p style="text-align: center;">Initiative #1 Maintain a Current Technical Environment</p> <p style="text-align: center;">Initiative #2 Improve the Student Experience</p> <p style="text-align: center;">Initiative #3 Advance Teaching and Learning</p> <p style="text-align: center;">Initiative #5 Continually Enhance Data Security</p>
Community Partnerships	Build strategic collaborations with community partners to meet the current and emerging workforce development needs of local residents, businesses, labor, and industry; deepen partnerships with cities and communities to advance climate justice; connect students to essential resources that support their education (food, housing, health services, technology, work-based internships); align educational pathways with in-demand skills; strengthen transfer pathways through effective intersegmental practices; increase the number of diverse skilled and degreed adults in the region.	<p style="text-align: center;">Initiative #1 Maintain a Current Technical Environment</p> <p style="text-align: center;">Initiative #2 Improve the Student Experience</p> <p style="text-align: center;">Initiative #5 Continually Enhance Data Security</p>

Table I: Mapping of Strategic Directions to Technology Initiatives		
Strategic Direction	Strategic Direction Description	2021-2026 Technology Initiative
Sustained Prioritized Resources	Invest in strategic partnerships and resource development to sustain prioritized goals, such as: providing tailored support services to increase enrollment and success among populations historically underrepresented in higher education; recruiting, hiring, and supporting diverse staff that reflect the demographics of the students served; implement robust and dependable technology resources; sustain effective professional development; develop and maintain facilities and climate-sustainable campuses to meet the needs of students, faculty, and staff; provide communication resources for faculty and staff to elevate student voices and present student and alumni success; provide an inclusive people-oriented culture aimed at creating a productive learning environment for students and a supportive working environment for all personnel.	<p>Initiative #1 Maintain a Current Technical Environment</p> <p>Initiative #2 Improve the Student Experience</p> <p>Initiative #4 Improve Operational Efficiency</p> <p>Initiative #5 Continually Enhance Data Security</p>
Institutional Effectiveness	Create and refine equitable systems and strategies to achieve greater outreach to key groups of prospective students and community stakeholders; make meaningful connections between academic programs, local economic needs and opportunities, and complex social and environmental problems; improve access and success at all stages of a	<p>Initiative #1 Maintain a Current Technical Environment</p> <p>Initiative #2 Improve the Student Experience</p> <p>Initiative #4 Improve Operational Efficiency</p>

Table I: Mapping of Strategic Directions to Technology Initiatives		
Strategic Direction	Strategic Direction Description	2021-2026 Technology Initiative
	student’s educational journey, from application and enrollment to poverty assistance to educational pathway selection, and two-year and four-year degree completion.	
Call to Action to Address Anti-Blackness, Racism, and Barriers to Equity	Address anti-black racism and other forms of racism and discrimination across all institutional policies, practices, programs, and services; create a welcoming, inclusive, and safe campus community to benefit all; recruit and retain a diverse staff that reflects student demographics; ensure each student and employee receives the support, guidance, and education or training needed to achieve their goals and thrive in the District environment.	Initiative #1 Maintain a Current Technical Environment Initiative #2 Improve the Student Experience Initiative #3 Advance Teaching and Learning Initiative #4 Improve Operational Efficiency Initiative #5 Continually Enhance Data Security

Appendix I District-wide Strategic Plan 2021-2026

<https://drive.google.com/file/d/1uAZfDfNKaVMQdO5kGxho2v62JDUTegwK/view>

Appendix II
CLPCCD IT Assessment Report

Chabot-Las Positas Community College District

IT Assessment

Final Report

August 5, 2022

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1 Purpose of the Engagement

The Chabot-Las Positas Community College District (District) engaged WTC Consulting, Inc. (WTC) to conduct an assessment of the IT environments of the District, Chabot College (Chabot), and Las Positas College (LPC) and develop individual strategic technology plans for the District, Chabot, and LPC.

This report addresses the assessment of the District IT environment. Two supplemental reports, Chabot-IT-Assessment-10cbp and LPC-IT-Assessment-07cbp, focus on the IT environments of Chabot and LPC, respectively.

2 Engagement Teams

Following are the members of the engagement teams.

2.1 Steering Committee

Chancellor's Office

- Theresa Fleischer Rowland, Vice Chancellor, Educational Services & Student Success

Chabot College

- Jamal Cooks, Vice President, Academic Services
- Dale Wagoner, Vice President, Administrative Services
- Matthew Kritscher, Vice President, Student Services

Las Positas College

- Kristina Whalen, Vice President, Academic Services
- Anette Raichbart-Saxe, Vice President, Administrative Services
- Jeanne Wilson, Vice President, Student Services

2.2 Policy Committee

The members of the Chancellor's Senior Leadership Team serve as the Policy Committee.

2.3 WTC Team

- Ann-Marie Lancaster, Engagement Manager
- Ginny Schroeder, Practice Director
- Scott Foy, Consultant
- Albert Slater, Consultant and Registered Communication Distribution Designer



3 Engagement Approach

At the beginning of the engagement, the District provided WTC with a number of relevant documents including strategic and educational master plans, planning and budgeting information, bond measures, organizational charts, a disaster recovery plan, and technical standards. WTC also issued a Start Letter requesting copies of existing documents in other areas. Additionally, WTC retrieved a number of documents from the District and College web sites including documents identified by faculty and staff during interview sessions.

A major component of the assessment process for the District was conducting multiple interviews with the District's Information Technology Services (ITS) staff including interviews with the Chabot and LPC Managers of College Technology Services. WTC also provided Chabot and LPC students, faculty, and staff the opportunity to respond to short online surveys and conducted individual interview sessions with sixteen faculty and staff.

4 Engagement Scope

All District locations were in the engagement scope, which included the following four locations:

- Chabot College
- Las Positas College
- Dublin District Offices
- Pleasanton Economic Development and Contract Education (EDCE)

All work was completed remotely.

5 Assessment Findings - Overview

In the following sections, we present key findings from the assessment process. We have organized our findings into the following nine categories.

- Organization
- IT Governance
- Physical Infrastructure Supporting Technology
- Data Network
- Voice System
- Cellular
- Servers and Storage
- Enterprise Applications
- User Systems



6 Findings - Organization

Overview

ITS is the information technology (IT) unit for the District. Chabot and LPC each maintain local technology departments reporting to the Chief Technology Officer. ITS includes staff responsible for the District IT environment with local staff responsible for the Chabot IT and LPC IT environments.

The District IT environment includes the physical infrastructure supporting technology, wireless and wired data networks, voice and voice mail systems, enterprise applications, servers and storage systems supporting enterprise applications, and user systems assigned to District staff. The Chabot and LPC IT environments include college server and storage systems, applications, classroom technology, student computer labs, and faculty and staff systems.

Strengths

- 6.1 Having an integrated IT organization for the District facilitates problem solving and promotes coordination in selection of hardware and software for common functions (e.g., data backup). ITS managers meet bi-weekly with the Chief Technology Officer (CTO), and Banner support staff also meet bi-weekly with the CTO.
- 6.2 ITS maintains District-wide standards for computing equipment.
- 6.3 A District-wide equipment decommissioning process is managed by Purchasing and Warehouse Services.
- 6.4 District IT manages enterprise license agreements as well as some vendor technology contracts accessible to the District, Chabot, and LPC.
- 6.5 ITS has a dedicated Project Manager for Bond Projects.

Gaps

- 6.6 ITS has no dedicated IT security staff and no ongoing externally-provided IT security services.
- 6.7 There is no ongoing IT security training for ITS staff.



- 6.8 There is no user security awareness program for students, faculty, and staff, including no periodic simulated phishing campaigns conducted for faculty and staff.
- 6.9 Although the Border Cisco ASA 5585 firewall systems are logged to a Splunk instance, District IT does not have a comprehensive event logging system to detect potential threats to enterprise IT resources.
- 6.10 District IT staffing constraints are impeding staff efforts in at least the following areas: maintaining up-to-date inventory detail, addressing equipment life-cycle management on a timely basis, and deploying server security and management tools.
- 6.11 There are no District IT staff dedicated solely to Chabot and LPC to assist college staff with business process development associated with enterprise application projects supporting administrative and student support services. Success of projects involving integration of new functionality typically depends in part on the involvement of staff providing leadership on the development of new work processes to fully realize the benefits of the new system. The work process development staff may be embedded in the college, but they are usually ITS staff and work closely with the technical ITS staff.

7 Findings - IT Governance

Overview

The District's current IT Governance structure includes one District committee and five College committees identified in the following list.

- CLPCCD District-wide Technology Coordinating Committee (TCC)
- Chabot Instructional and Services Technology Committee (IST)
- Chabot Facilities and Infrastructure Technology Committee
- Chabot Committee on Online Learning (COOL)
- Las Positas College Technology Committee
- Las Positas College Distance Education Committee

Strengths

- 7.1 The college-based technology committees provide an avenue for addressing specific instructional and technology support needs of the college and departments within the college.



- 7.2 The Technology Coordinating Committee (TCC), which includes membership from the District, Chabot, and LPC, provides a forum for addressing common hardware and software needs (e.g., instructional software) and policy requirements (e.g., Americans with Disabilities Act - ADA) with District constituent groups.

Gaps

- 7.3 The current IT governance structure does not address the following key aspects of ongoing technology enhancements and expansion and related business process development impacting the District, Chabot, and LPC:
- 7.3.1 The comprehensive leadership efforts required for both initial and ongoing integration of technologies and business process development to support the goals and priorities in the Chabot and LPC Educational Master Plans and the District-wide Strategic Plan, particularly those goals and priorities related to student enrollment and student success.
 - 7.3.2 The critical roles of Chabot and LPC college leadership and the District's Senior Leadership Team in IT decision making and prioritization.
 - 7.3.3 Ongoing assessment of Chabot and LPC academic, student support, and administrative processes that need to be updated or need enhanced technology support.
 - 7.3.4 Ongoing assessment of District student support, and administrative processes that need to be updated or need enhanced technology support.
 - 7.3.5 Communication processes within Chabot, LPC, and the District to keep students, faculty, and staff informed on available technology resources, expected process improvements resulting from completion of technology support projects, and planned future enhancements.



8 Findings - Physical Infrastructure Supporting Technology

Overview

The physical infrastructure supporting technology includes spaces housing technology and inside and outside cable plant, such as telecommunications rooms (e.g., MDFs, IDF, and fiber rooms). This infrastructure is bond funded and managed by the District. The assessment included a review of District infrastructure standards, Measure A documents, disaster recovery plan, and physical campus maps.

Strengths

- 8.1 The District infrastructure standards are comprehensive and can be used to guide architects and engineers to design building infrastructure that will support current and future physical infrastructure requirements.
- 8.2 Outside plant and inside riser cabling to and within campus buildings have been augmented to include singlemode fiber optic cabling, which will allow for future network and service bandwidth increases without changing the fiber optic infrastructure.
- 8.3 Most telecommunication rooms have been remodeled to meet the current District standard, which will allow for existing and future IT systems to actively support staff and students while also allowing for refreshment equipment installation without service interruption.
- 8.4 Most data network, WiFi, and Distributed Antenna System (DAS) cabling has been upgraded to CAT 6A cabling, which will allow for future network bandwidth increases without recabling.
- 8.5 Most voice and data cabling from telecommunication rooms to a standard faceplate include four CAT 6A cables.
- 8.6 Cabling from telecommunication rooms to infrastructure faceplates include four CAT 6A cables to support WiFi access points, DAS antennas, and future connections to a camera or digital sign.

Gaps

- 8.7 The outside plant infrastructure entering a District location is not physically redundant creating a single point of failure. Consequently, if the fiber optic cabling entering the street and traveling to the Main Distribution



Room (MDF) is cut, the data, voice, and in-building DAS cell service systems will be cut off from the Internet and the other District locations. It is our understanding that the District has evaluated service provider alternatives and costs and concluded that this is an acceptable risk.

9 Findings - Data Networks

Overview

The wireless and wired data networks, which are centrally funded by the District and centrally managed by District IT, serve all four District locations. A wide area network is formed using the AT&T ASE service interconnecting the four District locations. Wireless data network coverage within and surrounding buildings is distributed through WiFi access points. The access points are controlled centrally for each District location.

To ensure network equipment stays current and is supported by the vendor, District IT treats refreshment of network equipment as an ongoing process. Edge network switches were upgraded in 2018, and District IT has a project underway to migrate the network core equipment from older switches to more contemporary switches. This migration is expected to be completed in 2023.

Strengths

- 9.1 Bond funding supports ongoing refreshment of the wired and wireless data network equipment.
- 9.2 District IT actively manages the life cycle of the network equipment to ensure equipment is current and supported by the vendor.
- 9.3 The AT&T ASE service interconnecting the four District locations is a contemporary service with sufficient bandwidth at each site.
- 9.4 The District maintains dual CENIC Internet connections terminating in Chabot and LPC and configured for failover.
- 9.5 WiFi coverage in most buildings is ubiquitous coverage of the building's gross square footage with 802.11ac.
- 9.6 Outdoor WiFi coverage is concentrated on student congregation points.



- 9.7 District IT is continually monitoring the health of the network using Intermapper and Solarwinds network monitoring tools. Solarwinds also performs nightly configuration backups of the network devices.
- 9.8 The Border Cisco ASA 5585 firewall systems are configured as redundant, high availability pairs at Chabot and LPC. These systems are logging to a Splunk event management system, which is managed and monitored by the District IT networking staff.
- 9.9 For network segmentation, District IT is migrating network security policies from access control lists (ACLs) implemented on core routers to the Cisco Firepower firewall systems, which facilitate greater policy control and management tool sets (e.g., visual analysis, geo-location of IP addresses, intrusion prevention services).
- 9.10 Wired network ports are only patched and enabled on the switch as needed for connectivity to approved devices. Ports are configured for specific VLANs, which have access control policies appropriate for their use.
- 9.11 Intrusion prevention/detection functionality is licensed on the Firepower firewall systems.
- 9.12 District IT is leveraging the Firepower firewall systems to create security zones to address specific needs (e.g., isolating building automation systems that tend to have weak device security).
- 9.13 The District maintains Cisco SmartNet maintenance agreements on all network equipment with varying coverage and response levels depending on the criticality of the network device. There are a few exceptions such as older, outdoor-approved switches in locations needing only a limited number of connections. Additionally, there are sufficient device spares to address a switch outage.
- 9.14 The District maintains spare network devices for all network layers with the number of spares varying based on the role of the network device.
- 9.15 With few exceptions, edge network ports are configured with Power over Ethernet (PoE).
- 9.16 District IT maintains redundant power supplies on most network switches.
- 9.17 Although the WiFi controllers are at end of life, they will be supported until 2027 and upgrades of the wireless controllers are scheduled for 2025.



Gaps

- 9.18 The AT&T ASE wide area network has a single connection at each site.
- 9.19 CENIC Internet connections are provisioned over the same fiber path as the AT&T ASE wide area network.
- 9.20 Chabot and LPC each has only one core location and no redundancy in uplinks to the core from campus buildings.
- 9.21 There is limited WiFi coverage in parking lot areas at some District locations. The District leverages new construction projects to increase WiFi outdoor coverage when possible.
- 9.22 The District does not support an authentication system for the faculty and staff wireless network based on individual user accounts with corresponding access policies.
- 9.23 There is no captive portal on the public wireless network. A captive portal was implemented several years ago, but the users found it cumbersome, so it was removed.
- 9.24 District IT maintains several hidden SSIDs for use by designated groups accessed via common passwords. Access policies for these wireless networks are implemented via ACLs.
- 9.25 The current network access control approach that relies on the assignment of wired ports to a specific VLAN does not include individual user authentication to grant network access with designated privilege levels.



10 Findings - Voice Systems

Overview

Voice systems are bond funded and are managed locally by District IT and College staff with independent integrated voice and voicemail systems maintained at each of the four District locations.

Strengths

10.1 The district has standardized on using Avaya telephony systems with each campus having a separate Avaya voice system.

Gaps

10.2 The voice systems are not integrated together. Although upgrading all sites to VoIP and integrating the four Avaya systems to act as one system could allow for integrated voice across all District locations, it would require the purchase of uninterruptible power supply (UPS) equipment for each IDF and ongoing battery refresh every 2-3 years. Since this requirement would be cost prohibitive, the District has made the decision to maintain separate voice systems.

11 Findings - Cellular

The District has been expanding cellular coverage by installing distributed antenna systems (DAS). The DAS systems include a headend where cellular carriers extend their macro networks into a campus equipment room, then signal is distributed over fiber optic and Ethernet cabling to DAS universal access points within buildings.

Strengths

11.1 The LPC headend includes support for AT&T and Verizon. All teaching and administrative buildings have internal DAS cellular coverage.

11.2 The Chabot headend is under development and will be built out similarly to the LPC DAS.

Gaps

11.3 The DAS systems do not support T-Mobile services so end users with that service (or the old Sprint service) depend on outside cellular antennas for



cellular service. T-Mobile has not been responsive to attempts to contract their services to the DAS. The DAS systems are architected to support additional headend equipment at each location when T-Mobile is ready.

12 Findings - Servers and Storage

Overview

District IT staff manage the servers supporting District enterprise applications. Most District servers are in a secure location in the LPC IT building 1900 in Livermore in a separate room from the LPC server room. A smaller server room is maintained at the Dublin District office and network monitoring servers are located in the Chabot server room.

The District IT server staff have a project underway to upgrade the District virtual server infrastructure to include current generation host systems. This project was initiated based on a report from a consulting the firm that District IT engaged to assess the District's virtual server environment.

In response to problems experienced with the District's Microsoft Exchange email servers, District IT initiated a project to migrate faculty and staff email to Office 365 (O365) in September 2020. The District IT staff worked with a consultant to conduct the migration to O365 and are in the final phase of the migration process. After completion of this phase, the on-premises Microsoft Exchange servers will be retired.

Strengths

- 12.1 Bond funding supports ongoing refreshment of server and storage equipment.
- 12.2 Access to the data center housing District servers at the LPC IT building 1900 in Livermore is controlled and requires two-factor authentication, card key, and keypad access.
- 12.3 Access to the smaller server room at the Dublin District office is controlled using a card key system. Two access permissions are required, one for the hallway and one for the room.
- 12.4 District IT manages privileged access to systems through Active Directory security groups.



- 12.5 District IT manages network monitoring tools, including Intermapper and Solarwinds, both in the District data center at LPC and the Chabot server room for which access is controlled using a card key system.
- 12.6 There are uniform Unitrends backup systems for the District's non-Banner systems, Chabot servers, and LPC servers as well as structured processes for monitoring backup logs.
- 12.7 The Banner system is backed up to both an on-site tape system and the cloud. The Banner backup tapes are stored off site.
- 12.8 District IT uses a load balancing system with a firewall feature set to support the Banner environment.
- 12.9 Databases supporting the Banner environment are all on a supported Oracle platform.
- 12.10 Banner support staff maintain Visio documentation of Banner systems including rack locations, model and serial numbers, and other critical information.
- 12.11 Banner support staff are responsible for life-cycle management of the Banner servers and keep them in supported status.
- 12.12 For both Banner and non-Banner servers, District IT has processes for tracking and applying patches and updates.

Gaps

- 12.13 Time constraints impede District IT staff from being proactive in implementing non-Banner server refreshment. For example, migration from Generation 8 to Generation 10 virtual hosts was a reaction to service issues and recommendations from the external consultants.
- 12.14 While District IT maintains an inventory of its non-Banner servers, the inventory is not consistently kept up to date and complete, which is an impediment to proactive planning. As a result, District IT relies on their vendors to notify them when systems need to be replaced.
- 12.15 The Unitrends backup systems for the District, Chabot, and LPC do not currently provide off-site storage for backups. District IT has initiated a project to work with Unitrends to expand to cloud-based storage.



- 12.16 An external firewall and network segmentation protect the District servers, however, there is no endpoint security agent (e.g., Sophos) on the servers. Plans to deploy Sophos on the District servers are stalled due to staffing constraints.
 - 12.17 Staffing constraints prevented a successful deployment of the Microsoft System Center Configuration Manager (SCCM) endpoint management system for District Windows servers.
 - 12.18 There is no ongoing vulnerability scanning of District servers. Currently, an external vendor is conducting a one-time security assessment for the District, including scanning and penetration testing. Annual surveys will be conducted in compliance with system-wide requirements.
- 13 Findings - Enterprise Applications

Overview

District IT supports the following Ellucian production Banner modules: Student, Financial Aid, Finance, and Human Resources. These Banner modules are hosted on premises. District IT also supports two on-premises instances of Ellucian Degree Works – one for Chabot and one for LPC – and plans to migrate these two instances to a single instance, which is required for integrating Degree Works with the cloud-hosted CRM Advise. District IT also has a project to implement CRM Recruit, which will be hosted on premises.

Strengths

- 13.1 District IT upgraded its Banner system to Banner 9 except for some local forms still using Banner 8. A team has been assigned to complete migration of these forms, but a projected completion date has not been identified.
- 13.2 District IT has initiated a project to migrate ClassWeb currently on student self-service (SSB) Banner 8 to Banner 9, which will provide students with an improved user interface. This project will be completed no later than summer 2023.
- 13.3 District IT has integrated Banner with the Canvas Learning Management System with uploads from Banner to Canvas every three hours during the time period 7 a.m. - 11:00 p.m. and once overnight.



Gaps

- 13.4 While there are documented procedures for powering down enterprise systems in the event of an emergency and bringing them back up, the documentation needs to be updated.
- 13.5 While staff perform some ad hoc disaster recovery testing of enterprise applications, there is no formal, structured disaster recovery testing.

14 Findings - User Systems

Overview

District IT maintains user systems for District staff, who are not part of Chabot or LPC. District IT maintains an inventory of user systems, but depends on departments, who can order laptops, to provide information on these systems.

Strengths

- 14.1 Bond funding could support ongoing refreshment of District staff computer systems.
- 14.2 All user systems are Windows and run supported operating systems.
- 14.3 Although departments may order laptops, they work with District IT on specifications, and District IT needs to configure the laptop before it can be used to access District resources.
- 14.4 Administrator rights on staff systems are restricted. District IT performs all software installations.
- 14.5 District IT maintains images for user systems on a separate server, which is not connected to the network except when it is needed.
- 14.6 District IT uses the decommissioning process managed by Purchasing and Warehouse Services for its staff systems.

Gaps

- 14.7 Staff systems are not encrypted.



15 WTC Conclusions

Following are WTC's conclusions based on the IT assessment findings for the District.

- 15.1 The District physical infrastructure supporting the technology is solid reflecting comprehensive standards, remodeled equipment rooms, and augmented and upgraded cabling.
- 15.2 The District has standardized on using Avaya telephony systems with each location having a separate system.
- 15.3 The Bond funding to support refreshment of network and computing equipment eliminates the ongoing challenge facing most colleges and universities to keep network and computing equipment refreshed.
- 15.4 Findings from the IT assessment reveal gaps in the following areas that should be addressed as part of the District's Strategic Technology Plan.
 - IT Governance Structure
 - ITS Staffing
 - IT Security Posture

In the following sections, we present our recommendations in each of these three areas.

16 WTC Recommendations - IT Governance Structure

- 16.1 **Recommendation:** At the District level, augment the IT governance structure for prioritizing IT enhancements.
 - 16.1.1 The Chancellor's Senior Leadership Team (SLT) should have responsibility for final prioritization of IT enhancements and related communication to the District faculty and staff.
 - 16.1.2 The joint group of Chabot and LPC Vice Presidents should have responsibility for evaluating and prioritizing IT enhancements and making recommendations to the Chancellor's Senior Leadership Team. As part of the evaluation and prioritization process, the joint group should identify at least the following related requirements:
 - College staff resource.
 - Other college resource.



- College work process development.
- College staff education and training.

16.1.3 The Technology Coordinating Committee should make recommendations to a joint group of Chabot and LPC Vice Presidents regarding prioritization of IT enhancements.

16.1.4 The CTO should work with ITS staff to identify ITS resource requirements for the IT enhancements and what ITS staff allocation is feasible.

Rationale: ITS is responsible for the technical implementation of new systems or system upgrades, conveying technical constraints among applications such as module A needs to be functioning before module B can be implemented, and identifying feasible ITS staff allocations to projects. However, it should not be the responsibility of ITS to determine the importance of projects to the mission of the District, Chabot, and LPC. Consequently, District, Chabot, and LPC leadership need to be actively involved in reaching a consensus regarding prioritization of enterprise IT projects as well as identifying associated work process development, resource, education, and training requirements.

17 WTC Recommendations - ITS Staffing

17.1 **Recommendation:** Assign District IT staff with business analysis and project management skills and experience to assist Chabot and LPC with project management and business process development for projects involving implementation of enterprise applications.

Rationale: In general, projects with an experienced project manager progress more smoothly and are more likely to meet the expected goals and objectives. Additionally, a project manager can be effective at encouraging staff to complete their tasks in a timely manner, which can eliminate unnecessary delays. Often projects involving implementation of enterprise applications in a college environment require restructuring existing processes or establishing new processes, and a project manager with business process development experience can facilitate this work.

17.2 **Recommendation:** Integrate the task of updating the inventory into the installation or decommissioning process. On at least a monthly basis, reconcile the inventory with purchasing and surplus documentation to ensure the inventory was updated accurately.



Rationale: Having a current and complete inventory of District IT equipment is an essential component of efficient life-cycle management including maintaining appropriate warranties. With structured processes, updating the inventory as part of installation and decommissioning processes should add only minimal amounts of time to these processes.

- 17.3 **Recommendation:** For areas in ITS with staffing constraints impeding efforts to 1) implement management tools that will improve staff efficiency, 2) enhance IT security practices, and/or 3) maintain an appropriate life-cycle management schedule, increase ITS staffing and/or establish ongoing relationships with external service providers for periodic professional services.

Rationale: Lack of effective management tools, inadequate IT security practices, and gaps in life-cycle management all negatively impact staff workloads and IT security posture. Given budget constraints and challenges associated with recruitment of IT staff, using periodic professional services for targeted functions can be very effective and also addresses the specialized expertise required for some IT functions.

- 17.4 **Recommendation:** Identify District IT documentation that needs to be updated (e.g., powering down enterprise systems in the event of an emergency and bringing them back up) and establish processes for keeping documentation current.

Rationale: Not maintaining up-to-date documentation for critical technical tasks poses a significant risk that could result not only in outages that interfere with the day-to-day operations of the District, but could also introduce serious technical problems.

- 17.5 **Recommendation:** Establish a program of disaster recovery testing for enterprise systems. Start with tabletop testing with the goal of eventually including structured testing for critical systems. We recommend engaging an external service provider to assist with setting up the tabletop testing program.

Rationale: It is important that ITS staff are familiar with the procedures detailed in the ITS Disaster Recovery Plan and this is not likely without formal exercises. Establishing a tabletop testing program is an efficient way to maintain staff familiarity with the disaster recovery procedures and to make incremental adjustments to procedures based on lessons learned.



18 WTC Recommendations - IT Security Posture

18.1 **Recommendation:** Add IT security staff to ITS or procure external IT security services or adopt a combined approach to address the following IT security functions on an ongoing basis.

- Protection practices to secure District servers.
- Vulnerability scanning of District servers.
- Working with technical staff to mitigate vulnerabilities discovered.
- Aggregating logs for systems including enterprise servers, network and security devices.
- Monitoring alerts and analyzing event logs.
- Responding to and mitigating security events.
- Ensuring least privilege access to systems.
- Resolving compromised accounts.
- Supporting access and identify management system.
- Providing periodic assessment of security posture.

Rationale: ITS does not have any dedicated IT security staff. Additionally, addressing the growth in type and complexity of security threats increasingly requires a range of specializations that is beyond what one individual can realistically attain. It has become common practice for smaller organizations to acquire the services of one or more external IT security firms. Working with external security experts will also enhance the skills of the ITS staff. WTC does want to note that having at least one internal IT security staff member to facilitate the involvement of external providers and work with them to analyze event logs and respond to security events can be very effective.

18.2 **Recommendation:** Establish an ongoing IT security training program for ITS staff.

Rationale: It is essential that all ITS staff follow good IT security practices in their day-to-day work and are aware of the types of system behavior (e.g., slow performance, unusual activity, unexplained file change) that can be indicators of an IT security breach. With the landscape of IT security threats constantly changing, ITS staff need ongoing training to maintain an up-to-date level of awareness.



18.3 **Recommendation:** Establish a user security awareness program for faculty and staff that includes at least the following elements:

- Responsible user practices
- Protection of sensitive information
- Phishing and social engineering awareness
- Periodic simulated phishing campaigns

Rationale: A significant portion of IT security breaches are the result of risky user behaviors such as not protecting passwords, not securing sensitive information, or responding to phishing email. User awareness training has shown to be an effective tool in reducing risky user behavior and increasing users' abilities to recognize phishing attacks and social engineering attempts.

18.4 **Recommendation:** Establish a user security awareness program for students.

Rationale: A user security awareness program for students that is incorporated into introducing students to campus technology and acceptable use practices can encourage them to apply safe practices in their current or future work environments.

18.5 **Recommendation:** Discontinue using hidden SSIDs with common passwords to provide groups of users access to specific resources and implement an access and identity management system to authenticate users for the faculty and staff wireless network.

Rationale: Use of hidden SSIDs with common passwords to manage access presents multiple vulnerabilities (e.g., someone shares a hidden SSID and the common password with a non-group member, a group member leaves and common password is not changed). An open wireless network potentially exposes faculty and staff systems connected to the network to malicious activity on the network. Additionally, absence of access and identity management on the wireless network prevents access to District resources from on-campus laptops without the VPN. If in the future, the District migrates to replacing desktops with laptops as many colleges and universities have done, VPN capacity will likely become an issue.



- 18.6 **Recommendation:** After authentication services have been implemented for the faculty and staff wireless network, evaluate the benefits of requiring individual user authentication on the wired network to grant network access with designated privilege levels.

Rationale: Although risks on the wired network are mitigated by only provisioning network ports for approved devices and assignment to appropriate VLANs, authentication services on the wired network would add another layer of security.

- 18.7 **Recommendation:** After authentication services have been implemented for the faculty and staff wireless network, evaluate the benefits of adding a captive portal to the public wireless network.

Rationale: Having a captive portal enables the District to require users to agree to acceptable use policies and to capture data that would support investigating malicious traffic originating from the public wireless network.

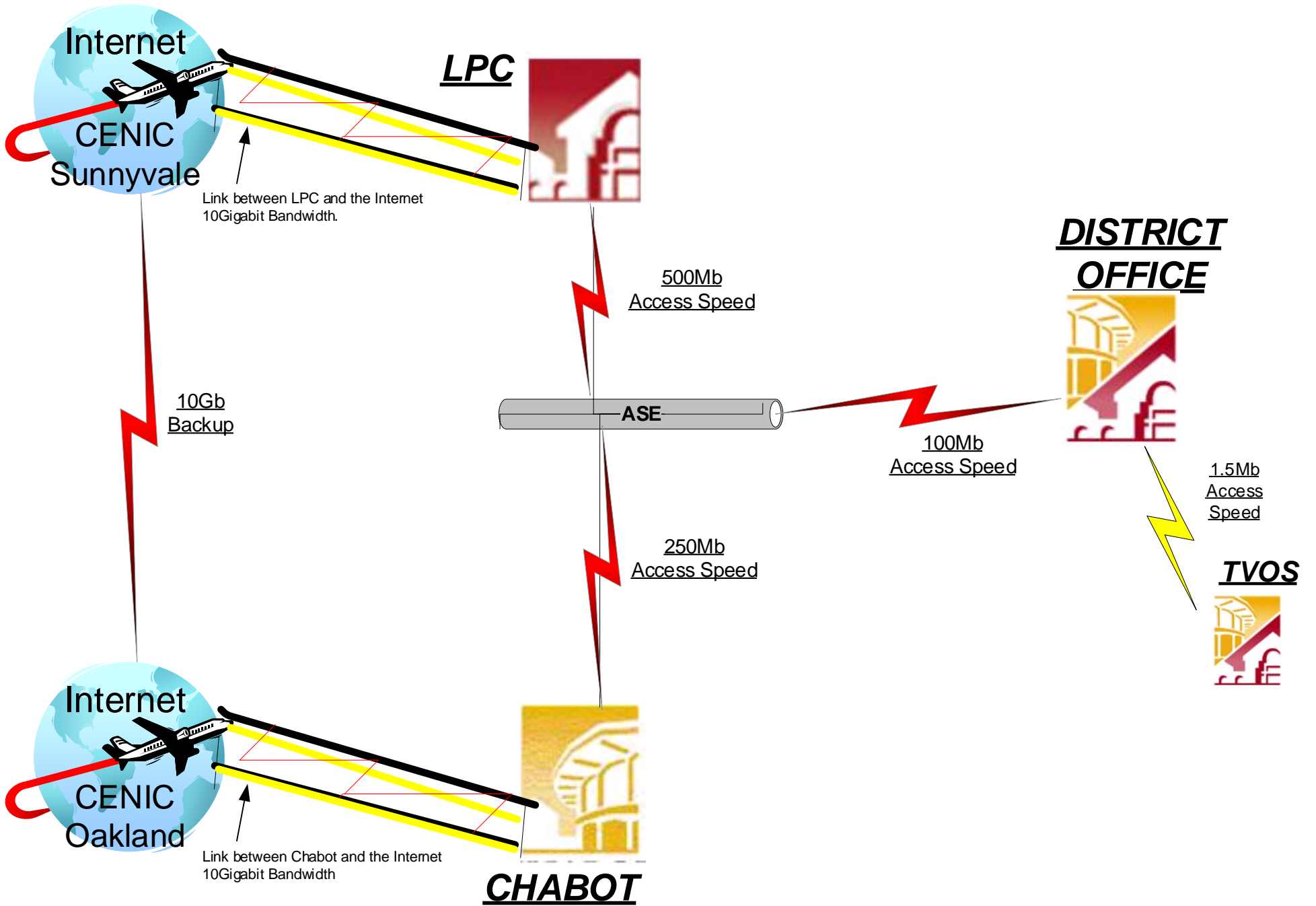
- 18.8 **Recommendation:** Together with Chabot Technology Services and LPC Technology Services, evaluate the feasibility of encrypting faculty and staff laptops and desktops given staffing constraints and weigh the benefits versus potential negative ramifications. Additionally, evaluate the possibility of encrypting only a subset of laptops based on risk.

Rationale: Encrypting faculty and staff desktops and laptops provides another layer of protection against unauthorized access to institutional resources and is a practice at many colleges and universities. On the other hand, staffing constraints and potential negative ramifications may be impediments to adopting this practice. It would be important for the District to document the results of their evaluation process.

- 18.9 **Recommendation:** Consider the benefits of implementing a mobile device management system for faculty and staff laptops and if the staff support requirements are feasible given staffing constraints.

Rationale: A mobile device management system for faculty and staff laptops is an effective tool for managing and tracking systems and provides IT staff with the capability of wiping clean the disk of a lost or stolen laptop. However, managing the system does require IT staff support and IT staff constraints may be an impediment. However, engaging professional services may be a way to mitigate staffing constraints.

Appendix III
Network Diagram



Appendix IV

Technology Coordinating Committee (TCC) Charter

CLPCCD Technology Coordinating Committee (TCC)

Open meeting and core representatives use a consensus decision-making process informed by the Guiding Principles of the IPBM process. Keeps and posts minutes on the web. This committee will meet monthly initially and then as appropriate.

Charge:

Coordinate technology related information periodically between the colleges in order to:

1. Make recommendations to the CLPCCD Planning and Budget Committee for district-wide support for technology planning at the Colleges and the allocation of resources beyond those outlined in the Budget Allocation Model (BAM).
2. Facilitates the coordination, alignment, and integration of college technology planning with district-wide technology planning and resources allocation.
 - a. Review and evaluate technology planning and maintenance for alignment with the district and college educational missions, goals, strategic plans, community expectations, and student learning needs.
 - b. Discuss district-wide technology projects and issues as they relate to academic, administrative, mandatory regulations and security needs in order to improve and increase communication.
 - c. Coordinate information related to the maintenance and improvement of websites.
 - d. Provide support, including the identification of resources, to the Colleges to make sure that technology is being implemented in a timely and effective manner.
 - e. Assess user knowledge/satisfaction of existing enterprise systems, including hardware and software.
 - f. Identify technology needs including training for faculty and staff, as they arise with regard to common enterprise systems, network infrastructure, and equipment.
 - g. Research new technologies that better serve students and staff by soliciting and making use of the expertise that is available district-wide.
 - h. Identify user groups that will help select common enterprise systems, including hardware and software.
 - i. Identify possible funding sources in order to take advantage of purchasing resources through the economies of scale.
 - j. Provide a forum for discussion and input into the Technology Master Plans and the District ITS Strategic Plan.
3. Coordinate compliance to accreditation standards related to technology.
4. Regularly assess committee processes and use assessment results for continuous improvement.

Chairs (3): The Committee shall be chaired by one Administrator (Chief Technology Officer), one Faculty and one Classified representative. Co-chairs will be elected at the first meeting of the committee, with attention given to the equal representation at all sites. The district co-chair is a facilitator and a non-voting member, unless there is a tie, and serves as a liaison to other district-wide committees.

Core Representatives:

Administrators (4):	Vice President or Delegate, Chabot (1) Appointed by President Vice President or Delegate, Las Positas (1) Appointed by President Network Systems and Services Manager (1) Appointed by Chancellor, Administrator, At Large (1)
College Tech Staff (2):	Senior Instructional Network Systems Specialist, Chabot (1) Senior Instructional Network Systems Specialist, Las Positas (1)
Faculty (4):	Appointed by the Academic Senates.
Faculty Association (1):	Appointed by the Faculty Association.
Classified Staff (3):	Appointed by the Classified Senates.
Classified Union (1):	Appointed by the Classified Union, SEIU Local 1021.
Students (2):	Appointed by the Associated Students.

Note: Appointees from the Academic and Classified senates should first be made from the College Technology and Distance Education Committees.

Key Performance Indicators used for assessment of technology projects

- User satisfaction of common enterprise systems, including hardware and software
- Number of training opportunities and user satisfaction related to training
- Productivity improvements resulting from implementation of common systems
- Amount of manual paper processes replaced by electronic systems
- Adequate resources for IT and users to implement and maintain enterprise systems
- Effectiveness of various modes of communication channels between IT and its users
- Monitor Technology Plans and progress towards goals
- Results of pursuing external and internal funding sources

Reporting/Recommending Responsibilities:

Primary – CLPCCD Planning and Budget Committee (PBC)

Other –

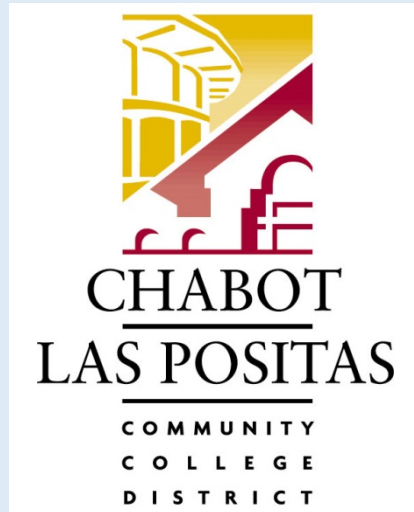
- Chancellor
- Chancellor's Council

Note: The term 'technology' includes both instructional and non-instructional technology.

Appendix V

2017 Information Technology Total Cost of Ownership (TCO) Plan

*CHABOT-LAS POSITAS
COMMUNITY COLLEGE DISTRICT*



*INFORMATION TECHNOLOGY PLAN
TOTAL COST OF OWNERSHIP*

February 21, 2017

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1.0 INTRODUCTION

The Chabot-Las Positas Community College District is implementing a Total Cost of Ownership (TCO) process for both Facilities and Information Technology effective in February 2017. This is in response to the Accrediting Commission for Community and Junior Colleges (ACCJC) recommendation received in January 2016 which states that “the Colleges and District should update and integrate their long range facilities planning process to reflect the total cost of ownership projections of facilities and equipment”. Both Facilities and Information Technology (IT) have developed a Total Cost of Ownership (TCO) Plan for their respective areas which will be included in the March 1, 2017 Follow-up Report to ACCJC.

Technology improvements are an integral part of the Facilities Master Plan. Therefore, technology equipment must follow the same TCO guidelines as Facilities. However, whereas Facilities looks at gross square footage for their buildings as part of the TCO analysis, the technology equipment requirements can vary substantially by building dependent on whether it is an office building or a student centric building with heavy technology. The technology equipment includes various categories of equipment to support new buildings, facility renovations, and refresh upgrade cycle for existing equipment in older buildings not under construction. Thus, the TCO for technology equipment is reviewed by the different equipment categories which vary in support levels. Information Technology utilized the TCO analysis methodology from the Gartner, Inc., who is a leading information technology research and advisory group, to determine how CLPCCD compares to the TCO recommendations. The Gartner model uses the IT Key Metrics Data (ITKMD) to calculate a price based on equipment type for infrastructure and operations with recommended staffing levels. The TCO life cycle encompasses all phases of the technology’s usage from design, through procurement and deployment and through obsolescence.

Through the Measure B Bond program, Chabot-Las Positas Community College District (CLPCCD) has completed substantial improvements and growth in college facilities. The Information Technology improvements included upgrades to servers, desktop/laptop, audio-visual, network and cabling infrastructure. Where feasible, equipment support contracts for bond-funded equipment were also procured when available from vendors. The intent was to have a full-supported Information Technology infrastructure up to the end of 2017, and then the new Measure A would continue from where Measure B ended. For Measure B, CLPCCD District ITS and College Technology departments did follow the TCO model for hardware and software purchases, installation, training, and maintenance support, which will continue and be expanded where appropriate for the comprehensive Total Cost of Ownership process being implemented for Measure A. The technology departments coordinate all aspects of the technology equipment acquisition costs, including hidden costs through the full equipment life cycle as well as insurance and disposal of obsolete equipment. They are also responsible for all ongoing support costs.

While elements of the Total Cost of Ownership have been included in equipment discussions and decision-making for a number of years for the technology implementations related to the

Measure B bond program, a more formalized Total Cost of Ownership process will be instituted in the district's long range planning procedures for the new Measure A bond. The District Facilities Master Plan is the institutional long-range planning document that describes the results of the facilities planning process. The District Technology Plan addresses the technology aspects of facilities and equipment planning for the District and Colleges. The District Technology Plan is completed separately, but aligns with the Facilities Master Plan as well as the District Strategic Plan and the College Educational Master Plans. The District Technology Plan is developed from user inputs on the college and district technology requirements, in coordination with both Colleges' Technology Committees and the district-wide Technology Coordinating Committee. A new Technology plan will be developed in 2017, which will include Measure A bond projects and other Enterprise Technology initiatives. The current Technology Plans are posted on the district web site at <http://www.clpccd.org/tech/TechnologyPlans.php>.

For the Measure A bond, the Board Policy on Institutional Planning (BP 3250) has been revised to include Total Cost of Ownership in the implementation of the Facilities Master Plan. Related to the construction and maintenance of buildings is the ongoing operation and improvement of Information Technology equipment and services. In addition, a new Administrative Procedure AP3253 "Total Cost of Ownership" was created to define the total cost of ownership and its implementation.

For the TCO guidelines, technology equipment includes various categories of equipment. The Measure B bond provided funding for Information Technology improvements to servers (application systems), desktops/laptops, audio-visual (smart classrooms), network and cabling infrastructure (wired and wireless), and generators/UPS for data centers. While the Measure B Bond program was able to cover equipment and support including initial training, ongoing staffing and training costs were not included. As such, the expanded equipment and infrastructure provided through the Measure B Bond projects is being maintained by similar staffing levels and resources that have not changed since the start of Measure B in 2005. Staffing increases were not covered by the Measure B Bond, and the CLPCCD General Funds were not available to fund staffing increases due to budget constraints. Beginning in the 2016-2017 year, budget has been made available for a limited amount of staff augmentation in the CLPCCD District ITS and College Technology departments.

This document examines the industry approach for Total Cost of Ownership (TCO) for Information Technology systems and its application to CLPCCD District and College facilities. For TCO, CLPCCD will use the same model for Measure A as was used for Measure B. The TCO model did include hardware and software purchase costs, installation, initial training and maintenance, but it did not include staffing expansion costs. This document contains actions for ensuring that CLPCCD District and College Technology staff can acquire and maintain its resources as specified by Total Cost of Ownership recommendations for technology equipment. Staffing will be addressed as a critical part of effectively managing the total cost of ownership for the new Measure A technology improvements.

2.0 INFORMATION TECHNOLOGY TOTAL COST OF OWNERSHIP

In the Information Technology industry, Gartner, Inc. is regarded as a leading information technology research and advisory company. The Gartner Group (now Gartner, Inc.) originally introduced the concept of **Total Cost of Ownership (TCO)** in 1987. The Gartner Group also worked with the California Community Colleges Chancellor's office in 2000 to provide input for the Technology II Strategic Plan for 2000-2005.

Gartner defines total cost of ownership (TCO) for Information Technology (IT), as "...a comprehensive assessment of information technology (IT) or other costs across enterprise boundaries over time...including hardware and software acquisition, management and support, communications, end-user expenses and the opportunity cost of downtime, training and other productivity losses¹". Total cost of ownership analysis attempts to define both the obvious costs for acquisition and ongoing support and the so-called "hidden" costs of ownership across the full ownership life or life cycle of the acquisition. The Gartner model uses the IT Key Metrics Data (ITKMD) to calculate a price for infrastructure and operations with recommended IT staffing levels. Gartner is the TCO model that was used to do an IT analysis to see how CLPCCD compares to the TCO recommendations including staffing.

In defining ownership life², CLPCCD ITS takes into account the following areas influencing the useful lifespan of IT systems:

- **Economic life.** - The number of years for which the IT system provides more value to CLPCCD than it costs to own, operate, and maintain. When ongoing costs exceed returns, the IT system is considered to be beyond its economic life.
- **Service life.** - The number of years the IT system is actually in service providing appropriate functionality and performance for the requirements at CLPCCD sites.
- **Depreciation life** - The number of years over which financial systems charge depreciation expense.

While the economic life may be a factor in which upgrades should be planned, the service life is more often the defining factor. CLPCCD District ITS and College Technology use the service life for determination of equipment life. In IT, discrete systems and technologies present different life cycles to analyze. For example, tablets and laptops exceed their service life in functionality and usefulness faster than Enterprise server systems. If a computer can no longer do the job needed by the staff, faculty or student, then upgrades are mandatory because the device has reached the end of its useful service life.

¹ Gartner IT Glossary 2016. <http://www.gartner.com/it-glossary/total-cost-of-ownership-tco/>

² Total Cost of Ownership TCO Explained, [Business Encyclopedia, ISBN 978-1-929500-10-9.](https://www.business-case-analysis.com/total-cost-of-ownership.html)
<https://www.business-case-analysis.com/total-cost-of-ownership.html>



Costs of ownership span beyond the procurement process itself. In the life cycle graphic shown, an IT system or technology requires different types of IT effort, as it moves from a new deployment to an aging service. The various phases include Planning, Procurement, Deployment, Management, Support and Disposition. Each phase requires IT to provide specific IT knowledge and task execution. The ongoing cost of ownership incorporates all expenses for staff, equipment and support to execute those tasks.

More specifically, the factors contributing to the Total Cost of Ownership for IT Technology include:³

Acquisition Costs - These are the costs that contribute to the original procurement of the technology:

- **System Design:** The new technology will require design by internal resources or external partners/consultants, which include the following tasks that could be iterative.
 - Analysis and inventory of the current environment's capabilities and limitations
 - Design of new environment
 - Research of the possible solutions
 - Documentation of solution, management presentation and approvals
 - Creation of the bill of materials for the new solution
- **IT Hardware/Software Equipment:** This can include:
 - Server hardware and software
 - Workstation hardware and software

³ How to Determine TCO, ShoreTel, 2016. http://www.lantelligence.com/wp-content/uploads/2016/06/How-to_Determine-TCO-for-IP-Telephone-Systems.pdf

- Network hardware and software
 - Warranties, ongoing hardware/software support and licenses
- Acquisition Process: In working with the procurement department, the following tasks would need to be executed:
 - Development of the bid package
 - Advertisement to potential bidders
 - Execution of the bid process/bidder management
 - Funding allocation or financing options
 - Ordering, receiving, inventorying and processing payment for the IT technology solution.
- System Implementation: This includes all tasks with bringing the new technology into production.
 - Equipment configuration
 - Migration from existing hardware and software platforms
 - Conversion of data from existing environment
 - Testing and functionality acceptance
 - Corrections to new environment as needed
 - Downtime during conversion to the new system.

Hidden Acquisition Costs may include:

- Diminished Performance:
 - Old system performance issues before new system is brought online.
 - Conversion from manual processes which may result in work slowdowns or performance as the new system is being learned.
 - First day/week/month implementation issues that need to be corrected.
 - Functionality changes that make the new technology different or more difficult to use.
- Facility Improvements: These are changes that might be needed in order to accommodate the new technology.
 - Room/Floor space construction or refurbishment
 - HVAC/power improvements
 - Rack/cabinet changes or additions
 - Space reallocation or equipment rearrangement
 - Security costs: building locks, secure entry doors, CCTV, security staffing, electronic security (card readers, motion detectors, alerting to security personnel)
- Network Upgrades:
 - Additional copper/fiber cabling
 - Network ports and bandwidth increases required to support new equipment connections
 - Patching.
- Training:
 - Administrative and operational training for IT support staff.
 - End-user training on features, functions and operations of the technology.
- Insurance: Equipment damage/theft and replacement costs.
- Decommissioning: These are costs associated with the disposal of the old equipment.

-
- Recycle fees for disposal of old electronics. Environmental compliance reporting.
 - Disassembly and transport fees of equipment
 - Termination of support agreements/partnerships, including late termination fees or contract buy-outs

Ongoing Costs – These are costs associated with keeping the new technology running.

- System Maintenance:
 - Maintenance including backups, logfile analysis, storage restructuring, security procedures, and other tasks.
- System Upgrades:
 - Assessment of upgrades to enable performance enhancements or correct issues.
 - Design of expanded system.
 - Procurement of additional items such as software licenses, memory, disk, CPU expansion.
 - Configuration, testing and implementation
- User Changes:
 - Ongoing modifications of the technology to address changing user requirements
 - Application customization/additions
 - Password, access or location changes.
- System Management:
 - Daily/weekly/monthly management of each system is required to maintain peak performance
 - Identification of impending problems
 - Optimizing performance and operations.
- Staff Augmentation: hiring of additional staff or consultants to provide expertise required for new or advance systems deployment.
- Ongoing Training:
 - Administrative training for IT staff on new or modified processes and functionality.
 - Development and distribution of user training and updates.
- System Downtime: Scheduled or unscheduled downtime that creates a disruption of service to CLPCCD students and staff.
- Audit: Internal or external audit procedures for new technology.

IT systems are in a constant state of upgrade, change and improvement. Thus, IT equipment life cycles are typically shorter than other capital items, ranging from four to ten years, with extended life spans depending on the technology. The anticipated life cycle of CLPCCD Technology equipment is as follows:

- Desktop/laptop computers: 4 years
- Servers: 5-7 years
- Printers: 5 years
- Network equipment: 7-10 years
- Network cabling: 20-25 years

- Audio-Visual equipment: 7 years
- Telephony systems: 8-12 years
- UPS: 15-20 years
- Generator: 20-30 years

CLPCCD ITS and College Technology staffing assess equipment usefulness to determine life span. Innovative technology that does not exist in the industry as of yet will make the current equipment obsolete and will reduce the service life when available.

Coupling these items with the growth of IT systems made possible by the Measure B bond, CLPCCD ITS and College Technology departments have been presented with a significant impact to ongoing costs and a constant state of rapid change for the CLPCCD ITS staff.

To reduce TCO in IT organizations, a number of Best Practices have been identified, some of which include⁴:

- **Stable IS Organization:** A stable staff keeps deployments consistent and focused. CLPCCD ITS has been fortunate to maintain talented staff who have worked in the District for 10+ years. This provides a “braintrust” of experience to draw on for upgrades and new installations.
- **Vendor Standardization:** With vendor standardization, CLPCCD ITS can gain purchasing leverage and reduce incompatibility issues, support issues, administrative costs and have access to new technology for prototyping. For the Measure B Bond program, CLPCCD standardized on all IT equipment for switches, routers, network infrastructure, desktops/laptops, servers, audio-visual equipment and cabling. CLPCCD reviews the current standards annually to assess the new technology available to satisfy the college and district needs.
- **Training:** Professional training for CLPCCD ITS staff allows for confident knowledge in all support tasks ranging from planning new deployments to resolving end-user issues. Self-training performed as time permits may gain knowledge, but without a thorough and consistent understanding. Focused classes through vendor offerings reduce the net amount of time spent learning, and result in more effective implementation and troubleshooting. Formal training on vendor products is provided as part of the system implementation for both IT staff and user departments.

To quantify the ongoing cost of operations, Gartner has released a Total Cost of Infrastructure and Operations (TCIO) model in 2016⁵. This model addresses “Technology Domains” including Data Center, Networking, Client computing and Service Desk. Costs in each domain including operating and capital expenditures, generate an annualized TCIO.

⁴ Reducing TCO in Higher Education: Best Practices. Gartner, 1999.

⁵ Using Gartner’s TCIO model to Optimize Costs, 2016. <https://www.gartner.com/doc/3229020/using-gartners-tcio-model-optimize>

In this document, the TCO for each of the following IT Systems will be examined in detail:

- Server technology, including Enterprise, standalone and blade servers, and their operating environments.
- Data Center facilities at Chabot, Las Positas and the District Office.
- Desktop computing environment, including PCs/Macs, laptops and tablets and their software.
- Network infrastructure, including wired and wireless data equipment and cabling plant.
- Audio-Visual technology, including smart classroom, conference room and lecture halls.
- Telephony systems, including telephone systems and voicemail.

Where applicable, TCIO models are applied and discussed for each technology.

CLPCCD ITS and College Technology departments have made operational and architecture choices to minimize the ongoing costs of ownership and better position the available staff to support the technology expansion and increased sophistication. The TCO approach for each specific area is documented in the following sections.

3.0 CLPCCD SERVERS

A key responsibility for CLPCCD ITS and College Technology staff is the ongoing operations and maintenance of application servers. Centralized server applications with near 99.99% uptime are mission-critical for the support of functions at the Colleges and the District. With ongoing changes in academic and student needs, there is a continued expansion for the deployment and support of administrative and instructional applications.

The expansion of servers and applications has presented an increasing workload for District and College Technology staff. CLPCCD has made several choices to optimize the way that servers are installed and maintained. These choices have lessened the cost of ongoing ownership and support.

College Application Servers

Prior to 2005, the server environment at CLPCCD sites was composed of many kinds of “home-grown” disparate systems, often assembled by hand, and maintained by in-house staff. This led to variations in performance and stability, a lack of interchangeability of parts, and a requirement for custom knowledge for maintenance and repair. Downtime was unpredictable because of the availability of parts and skills when a server failed. The College servers consisted of the following:

2005 College Server Statistics

Location	2005	Operating System
Chabot	11	Windows
Chabot	1	Linux
Chabot	3	MacOS
Chabot Totals	15	
Las Positas	6	Window
Las Positas	2	Linux
Las Positas	0	MacOS
LPC Totals	8	

As the number of servers continued to grow, the disparate hardware and operating environment led to an unacceptable support situation for mission-critical College and District applications.

At the beginning of the Measure B bond, a committee of District and College technical staff was formed to analyze and define a common approach for servers across CLPCCD locations. The following items were addressed:

- Establishment of Server Standards – One of the first tasks performed was the selection and establishment of a standard for server hardware. An assessment of the mainstream suppliers resulted in the selection of Hewlett-Packard servers for the hardware platform. Specific models of Hewlett-Packard (HP) DL servers were chosen, with standardized disk, memory and CPU.
- Acquisition of Support Contracts – Servers were purchased with supplier/manufacturer support. This increased the availability of parts, skilled technicians for repair and timeliness of repairs.

These decisions were key in improving the ongoing cost of ownership, through optimized CLPCCD maintenance efforts, less failures and faster return to operations than were previously possible. These approaches were effective in reducing the Total Cost of Ownership for acquisition and ongoing support costs, but did not address staffing support.

Early in the Measure B bond (2007), CLPCCD ITS and College Technology staff migrated the servers from the existing platforms and onto the standalone HP servers, thereby enabling a robust server environment. Since the life cycle of a server system is typically 5-7 years, a number of replacement migrations were undertaken from 2013-2015. This has allowed CLPCCD to also take advantage of recent technology migrations, including:

- Upgrades in disk technology from iSCSI to SSD storage, and individual disks per system to shared SAN arrays.
- Upgrades in backup technology for more reliable and efficient storage.
- Migration of server architecture from standalone servers to blade chassis systems.

- Change in server management environments from individual OS to VMWare/Hyper-V virtualized management running multiple OS instances.

The move to the blade/SAN technology with virtualized environments has been demonstrated to lessen the ongoing cost of support and maintenance in many ways⁶:

- Better resource use: Since virtualized servers share CPU/memory/disk, the hardware is more closely used to its maximum capacity, rather than in standalone servers where capacity may sit idle.
- Lower power consumption: Blade chassis support many servers with a consolidated power source, significantly reducing the number of 100v or 208v power connections and net power consumption by 20-40%.
- Faster server set up: Instead of a several week set up time for configuring, buying, receiving and setting up a new server, a virtualized server can be installed and working in a matter of hours.
- Easier recovery from failure: Management utilities provide automatic or administrator-initialized recovery from hardware/software failures. This moved servers across chassis and virtualized environments, so repairs on failing components can be done with a minimum of downtime.

College Technology has begun the migration to virtualized servers. Now supporting 30+ standalone servers, future purchases for Chabot funded by the Measure A bond will include blade/SANS architectures for applications compatible with a virtualized environment. LPC Technology similarly supports 22 servers and is planning to move towards blade/SANS architectures as part of their strategy to optimizing the LPC server environment.

2016 College Server Statistics

Location	Quantity	Operating System	Growth Factor from 2005	Growth % from 2005
Chabot	28	Windows		
Chabot	1	Linux		
Chabot	1	MacOS		
Chabot Totals	30		2 times	200%
Las Positas	19	Window		
Las Positas	2	Linux		
Las Positas	1	MacOS		
Las Positas Totals	22		2.75 times	275%

⁶ 5 Reasons to Switch to Virtual Servers, University Business 2009 <https://www.universitybusiness.com/article/5-reasons-switch-virtual-servers>

District Servers

Like the College servers, the application server environment at CLPCCD District was composed of “home-grown” disparate systems, often assembled by hand, and maintained by in-house staff. Similar performance and stability issues occurred as was described above for the College servers. At the start of the Measure B Bond in 2005, the server distribution was:

2005 District Server Statistics

Location	Quantity	Operating System
District	6	AIX
District	2	Linux
District	18	NetWare
District	5	Windows 2000
District Totals	31	

For Enterprise applications, CLPCCD ITS has standardized on the Ellucian Banner application as the ERP system for CLPCCD. Running on IBM AIX servers, CLPCCD ITS has been able to leverage staff experience and knowledge to maintain efficient operations and execute substantial upgrades.

Initially housed in the Chabot Computer room, CLPCCD ITS procured a replacement IBM pSeries 570 systems in 2007. This system was configured with primary and failover hosts to increase the reliability and business continuity in the event of a failure of the primary server. The District Data Center was relocated to the Administrative Computer Room in the LPC IT Building in 2009, where these servers were provided with optimal power, HVAC and humidity control to ensure maximum uptime.

As the number of applications increased, the performance of the IBM p570 systems was exceeded. Within the standard server life cycle and as the technology advanced, new IBM S822 systems were procured in 2012.

CLPCCD District ITS was able to optimize the ongoing cost of ownership through the following methods:

- Staff Expertise – Leveraging the long-time, experienced staff, the knowledge base for deployment of these new systems was comprehensive and thorough.
- Standardized Hardware and Software – Each deployment of the CLPCCD Enterprise servers have been based on IBM hardware with AIX operating systems and Oracle databases. This immediately gives staff a familiarity and confidence for new implementations.

In the past two years, CLPCCD District ITS has begun the migration to blade/SANS hardware with virtualized servers, now supporting approximately 106 servers in virtual environments. An additional 30 standalone servers currently exist, many of which will be migrated to virtual.

Because of unique architectural requirement that prevent a virtualized instance, there will still be a few servers that will remain on standalone hardware.

The current distribution of servers for District applications is:

2016 District Server Statistics

Location	Quantity	Operating System	Growth Factor from 2005	Growth % from 2005
District	19	Enterprise		
District	22	UNIX (AIX)		
District	44	Linux		
District	51	Windows		
District Totals	136		4.38 times	438%

Cost of Ownership Calculations for Servers

The Gartner TCIO model calculates a price for infrastructure and operations based on IT staffing and investment levels, and technology cost and performance metrics. The price is derived from the Gartner’s IT Key Metrics Data (ITKMD) which is refreshed annually and based on surveys and discussions with the customer base and industry sources.

Using the 2016 Gartner TCIO model, the ongoing costs for the servers maintained at the campuses are shown below. Refer to Appendix A for more description on how these calculations are derived:

Ongoing TCIO costs for CLPCCD Servers

Location	Number of Servers	TCIO per year
Chabot College	30	\$182,944.00
Las Positas College	22	\$133,848.00
District	136	\$1,984,369.00
Total		\$2,301,161.00

* TCIO annual cost includes costs for staffing, operations, facilities costs (power/HVAC), space, and other related costs.

4.0 CLPCCD DATA CENTERS

Through new building construction and modernization provided by the Measure B bond, CLPCCD ITS has improved the Data Center environments at CLPCCD Sites. In 2005, the only space designated as a Computer Room was a small and crowded space in Building 300 at the

Chabot College campus. This housed the Enterprise Server system and some smaller District servers, but was inadequate for the targeted growth.

Likewise, in 2005 and earlier, College campus servers were distributed across various buildings, in department offices, classrooms and telecom rooms. This caused very inefficient operations since College Technology staff had to go to various locations on campus for operational tasks. Servers were dedicated to single functions/applications and leveraging compute resources was not possible. In addition, the computer environment was not well controlled leading to variations in operational temperatures and power fluctuations.

As a result of an analysis of space, resources and operational stability, a decision was made to build a new IT Building on the Las Positas campus. This building houses an Administrative Computer room for the District Enterprise servers and provides a dedicated computer room for the Las Positas servers. During the renovation of Building 300 at Chabot, the previous Computer Room was renovated to provide up-to-date Server room functionality for a centralized housing of the Chabot Campus servers.

TCO costs for the new IT Building and Data Center spaces include:

Acquisition Costs

- Design: architect and engineering services
- Build: construction costs
- Real Estate: LPC campus location, housing both District ITS and LPC Technology departments. Chabot campus location, housing limited District ITS and Chabot Technology Staff. District office location in Dublin, housing limited District ITS staff.

Ongoing Costs

- Data Center-specific Infrastructure maintenance and upgrades: Support contracts for specialized infrastructure including UPSes, ATS/Generator, HVAC/Chiller, Security and other custom mechanical/electrical components.
- Utilities: Power, water for operations, included as part of the campus building TCO.
- Building maintenance and upgrades: included as part of the campus building TCO.

With the centralized server room spaces, the ongoing maintenance and operations have become more efficient than previously. Reliability of operation has also improved with backup systems and power protection systems.

Large-scale UPSes (30kW+) and site Generators at both the LPC IT building and Chabot B300 server room now support centralized server rooms, providing more efficiency for power usage and improved uptime. Ongoing costs for these components include:

- Generator: fuel, ongoing preventative maintenance, repairs.
- UPS: ongoing preventative maintenance, repairs, battery replacement.

With regular maintenance, generators used for standby emergency power can last 20 to 30 years. UPS systems can last between 15 and 20 years.⁷ Thorough and regular preventative maintenance programs are key to equipment longevity.

Cloud Hosting Model

While CLPCCD has largely deployed an in-house private hosting model, there is a perception of cost reduction as one of the primary benefits of adopting a cloud hosting model. In particular the comparison of capital expenses (TCO Acquisition costs) versus operational expenses (TCO Ongoing costs) often must be analyzed thoroughly in order to make the proper decision between outsourcing versus in-house solutions for each specific application.

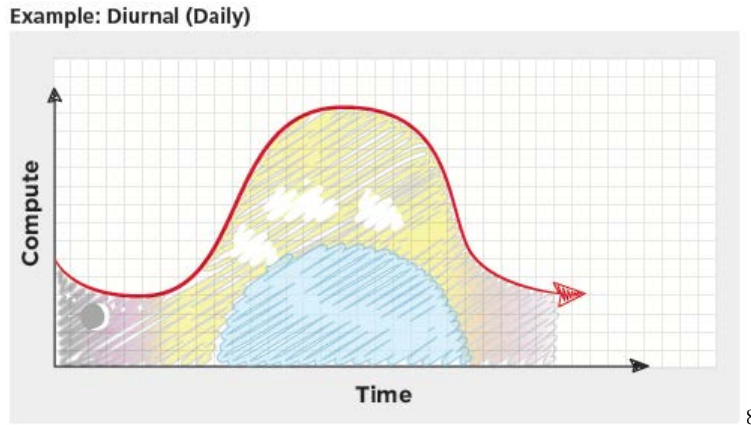
Application outsourcing can be of several models:

- IaaS – Infrastructure as a Service whereby the processing, storage, networks and other fundamental computing resources is provided by the hosting service and CLPCCD would deploy and run the custom applications for student and college support. CLPCCD would have control over selected processing, storage, deployed applications and some network components.
- PaaS – Platform as a Service whereby CLPCCD would deploy on a cloud infrastructure using services and tools provided by the hosting service, but not have management or control over the server infrastructure.
- SaaS – Software as a Service where CLPCCD uses the hosting service’s applications running in the cloud.

CLPCCD has invested in SaaS options for selected vendor products for course management and other third party products that interface with Banner. Specific applications for Distance Learning were well provisioned using the SaaS model provided now by Blackboard, and in the future by Canvas. More recent progress to outsourcing College web services took advantage of the Microsoft Azure PaaS services and the Omni update SaaS software. Other enterprise cloud systems using the SaaS model include services for Counseling (Cranium Café), Student Learning Outcomes (Elumen) and Student Tutoring (Nettutor).

A benefit of cloud applications is the 24x7 access. Computer and application usage for CLPCCD Enterprise and college servers is typically daytime, with peaks when the college campuses are in session with classes and student activity.

⁷ UPS Service Plans: How to Maximize Your Returns, Eaton, May 2010, Life Cycle Checklist, Eaton 2016



Round-the-clock access to applications as provided by a 24x7 hosting service is not as beneficial, since peak activity of CLPCCD access is usually at the same time each day.

CLPCCD ITS and College Technology departments maintain custom applications for the instruction and student administration. This reduces the possible options for the SaaS model. Ongoing staffing and training costs for either of the IaaS and PaaS models does not vary substantially with those of the in-house computing model. The cost of outsourcing for these applications would balance or outweigh the ongoing maintenance contracts in place for the CLPCCD in-house servers.

The specific outsourced applications described above, coupled with the in-house services available from the CLPCCD District ITS and College Technology servers provide an optimal operating environment for CLPCCD applications.

5.0 NETWORK CABLING AND EQUIPMENT INFRASTRUCTURE

CLPCCD District ITS is responsible for the network equipment and cabling infrastructure used for telecommunications at all CLPCCD sites.

Network Equipment

In 2005, at the beginning of the Measure B bond, the network infrastructure consisted of Cisco core routers and switches in the network core, and a minimal distribution of 10Mb unmanaged hubs throughout the buildings. While this was a very low-cost approach to implementing data connectivity, it provided limited performance and visibility into troubleshooting problems. The installed network ports were approximately:

⁸ Cloud Economics, Rackspace 2012

http://c1776742.cdn.cloudfiles.rackspacecloud.com/downloads/pdfs/WhitePaper_CloudEconomics.pdf

2005 Active Network Ports

Location	# of ports
Chabot	<1800
Las Positas	<1200
District	<48

Measure B bond expansion has grown connectivity of devices at each of the Chabot and Las Positas College campuses, plus additional connectivity at the District Office and Tri-Valley One-Stop (TVOS) sites in Dublin. In addition, the rollout of wireless technology, beginning in 2007, has increased the number of network users by approximately 2000 per day per campus. Network speeds have increased from a shared 10 Mbps transmission to 1Gbps transmission, with 10Gbps uplinks supported between buildings.

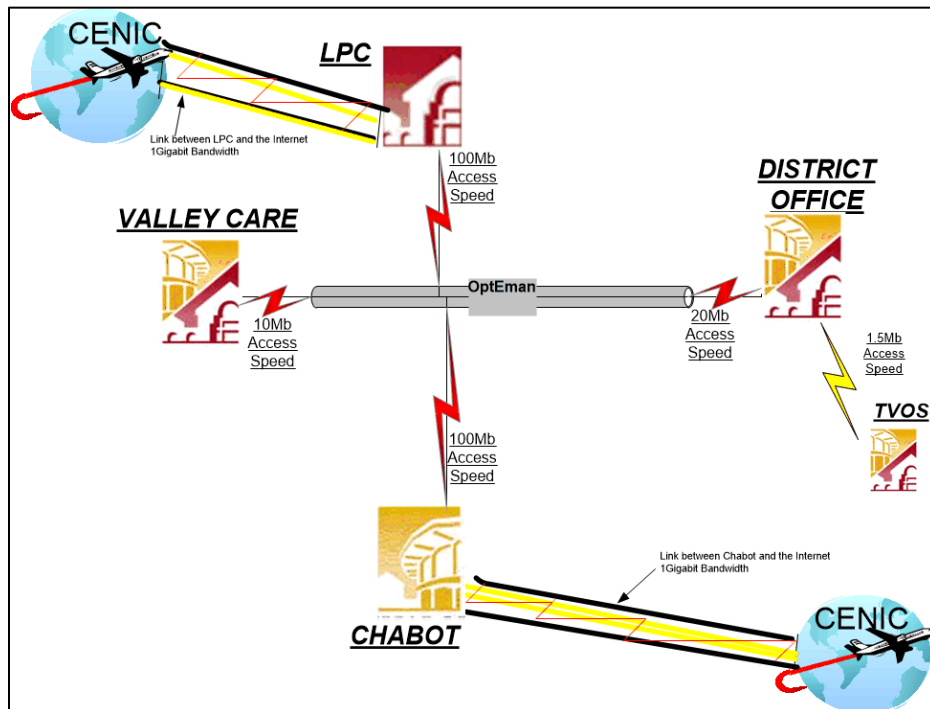
2016 Active Network Ports

Location	# of ports	Growth Factor from 2005	Growth % from 2005
Chabot	5520	3.06 times	306%
Las Positas	4720	3.93 times	3.93%
District	384	8 times	800%

CLPCCD ITS initially supported limited bandwidth site-to-site connectivity determined by the T-1 speed. As network activity increased at each site, CLPCCD ITS was able to incrementally add connections and redundancy to the WAN topology.

Connection	2005	2007	2016	Growth from 2005
Chabot to LPC	3 x T-1 (4.5 Mbps)		100 Mbps	22 times
Chabot to District	1 x T-1 (1.5 Mbps)	2 x T-1 (3 Mbps)	20 Mbps	13 times
District to LPC (redundant link to Chabot)	1 x T-1 (1.5 Mbps)		20 Mbps	13 times

In 2008, CLPCCD ITS upgraded the WAN router infrastructure to be able to support the AT&T OPT-E-MAN Ethernet service. These connections far exceed the bandwidth offered by multiple T-1 connections, with a simplicity of operation and upgrade.



CLPCCD District ITS maintains the network equipment operation using the equivalent of one full-time staff member. This has not increased since the 2005 and it is expected that another staff person will be added during the Measure A expansion. Through the following methods that increase operating efficiency, CLPCCD District ITS is able to achieve stable network operations and near 100% uptime:

- Cisco Equipment Standard – Using Cisco switching, routing and firewalls. Through the common IOS command set across equipment models, CLPCCD is able to leverage its staff knowledge for new deployments and ongoing operation of the network infrastructure.
- Standardized Configurations – CLPCCD District ITS has developed templates for each class of equipment. This includes base configuration, VLAN architecture, IP addressing, feature set deployment and cabling connectivity.
- 24x7 Monitoring – Using simple network management tools that actively probe and monitor equipment function, CLPCCD District ITS can be immediately alerted to unusual activity and outages, so restorative action can be quickly executed.
- Network Upgrades – Through the Measure B bond funding, CLPCCD has been able to procure equipment for network growth and to replace aging/obsolete equipment. This

keeps the network at the top of performance, with little day-to-day effort. Network equipment upgrades are necessary every 7-10 years to keep up with performance requirements. However, the actual replacement cycle may be accelerated and determined by security breaches or manufacturers' obsolescence schedules.

- **Manufacturer Support** – For the network core and high density equipment, CLPCCD District ITS has budgeted for Cisco SmartNet support. During troubleshooting and failure, this provides CLPCCD with up to 4 hour response time on equipment failure requiring replacements. Access to Cisco engineering resources as needed 24x7 is essential to restoring business continuity as quickly as possible.

Wireless Network

A completely separate network environment that was installed during the Measure B bond is the wireless infrastructure. At the beginning of the Measure B bond, wireless did not exist. CLPCCD ITS first began deployments of 802.11a/b/g infrastructure in 2009. This was upgraded in performance and functionality to the current 802.11n network in 2011.



Chabot: 118 access points in 39 buildings



LPC: 80 access points in 28 buildings

Wireless technology has continued to develop in areas of increased bandwidth, with the 802.11ac, Wave 2 version now readily available in the industry. The wireless significantly expands the network connectivity to Bring Your Own Device (BYOD) laptop, tablet and cellular devices, with 1000s more users. The CLPCCD staff who maintains the wired network also maintains the wireless connectivity. All of the wireless installations were new to the Bond Measure B since 2005, so the growth factor is also the current installation of 118 access points at Chabot and 80 access points at Las Positas.

Reviewing Gartner’s TCIO for networking, the cost estimates are typically based on the number of employees at a company. However, CLPCCD employees make up a fraction of the network usage, since student computer labs increase the number of connections significantly. Therefore, CLPCCD uses the number of connections to desktop PCs, which is a better representation of network usage. TCIO costs include:

Location	2016 Average TCIO/Unit/Year	Number of Active Connections *	TCIO per Year
Chabot	\$100	2780	\$278,000
Las Positas	\$100	1,955	\$195,550
District & TVOS	\$100	200	\$20,000
Total TCIO			\$493,550.00

* Note that this is wired and wireless connectivity for CLPCCD-owned devices. BYOD devices are not included. TCIO annual cost includes costs for staffing, operations, facilities costs (power/HVAC), space, and other related costs.

Network Cabling

In 2005, the network cabling connectivity used multi-mode 62.5 fiber and Category 3 and Category 5 cabling, usually installed by CLPCCD M&O and ITS staff. This allowed a piecemeal growth of the network connectivity as cabling could be added in rooms in an ad hoc fashion. However, this also led to the usage of low-end cabling, small and inadequate IDFs located on shelves in custodial spaces and mechanical rooms and many troubleshooting and operational issues.

Beginning with the Measure B bond, CLPCCD District ITS created a Cabling Infrastructure Standard that has been used for the new and modernized building construction. This standard has provided the following:

- Consistency – With a defined set of design guidelines, engineers and designers were able to produce drawings that clearly defined cabling standards, IDF size, power and HVAC requirements and layouts. This resulted in the construction of robust cabling infrastructure that had a minimum of variations, and could easily be maintained by staff.
- High Performance - Based on Commscope Systimax Category 6A station cabling with single mode fiber backbones, this standard established a state-of-the-art cabling infrastructure. The life cycle of cabling infrastructure is expected to be 20-25 years. While Category 6A cabling was considered leading edge at the beginning of the Measure B bond construction in 2005, the TIA-4966 standard for Educational Institutions now embraces Category 6A as the cabling standard needed for 802.11ac and future wireless connections, DAS, POE+, AV solutions and other infrastructures that require high-performance (1Gb+) network connections. As such, this forward-looking approach has well served CLPCCD ITS in being able to support current and future technologies that were not even in design when CLPCCD did its first building renovations.

With the Measure A bond construction, the Cabling Standards will be updated as needed, and will continue to provide a robust, standard cabling infrastructure for CLPCCD buildings.

6.0 DESKTOP AND LAPTOP SYSTEMS

Maintenance and ongoing operation of the desktop and laptop computing environment is one of the most important functions of the Chabot and LPC Technology departments. The efficient operation of computer systems used for instruction, labs and department functions is key in making sure student instruction is high quality.

Prior to 2005, the desktop systems in use varied in CPU, disk, memory and manufacturer. PCs varied from Intel P2 through P4, using Windows XP operating systems. Apple G3/G4 systems were used for specific applications, and few laptops/tablets were present. Equipment was acquired through direct purchase or at the LPC campus, lease-to-own. Campuses and the District operated independently in their procurement processes. While attempts were made to

standardize, there was still a huge variance in hardware. Maintenance of failed systems consisted of in-house staff swapping components to restore the PC back to service. The installed base of computers is shown below:

Measure B Desktop/Laptop Growth

Location	2005	2016	Growth Factor from 2005	Growth % from 2005
Chabot	1600	2370	1.48 times	148%
Las Positas	1175	1955	1.66 times	166%
District	74	205	2.77 times	277%

As described for the servers, the committee of District and College technical staff defined a common approach for desktops across CLPCCD locations. The following items were addressed:

- Establishment of Desktop Standards – The selection and establishment of a standard for PC hardware enabled CLPCCD ITS and College Technology staff to provide a consistent functionality across the sites.
- Joint Bidding – Colleges and the District joined together in issuing bids that represented the multi-year purchasing requirements. Volume purchases resulted in more attractive pricing through larger discounts. CLPCCD also received custom service and delivery options through the dedicated supplier.
- Support Contracts – Desktops were purchased with supplier/manufacturer support. This increased the availability of parts, skilled technicians for repair and timeliness of repairs.
- 4-year life cycle –Assessing the bond funding, PC growth and viable service life, a 4-year life cycle was established at the beginning of the Measure B bond. In the years between 2005-2016, eleven (11) refreshes occurred, each refresh including 25% of the installed base of desktops/laptops.

These decisions were key in improving the ongoing cost of ownership, through optimized manageable equipment rollouts, effective maintenance efforts, less failures and faster return to operations than were previously possible. The current environment uses state-of-the-art HP or Apple PCs. Laptops and tablets are provisioned as dictated by purpose, and are primarily Microsoft Surface, HP laptop and Apple iPad devices.

Using Gartner’s TCIO model for Client Computing, the following costs are calculated:

Site	2016 Average TCIO/per unit/per year	Number of Units	TCIO per Year
Chabot	\$1,015	2370	\$2,405,550
Las Positas	\$1,015	1955	\$1,984,325
District	\$1,015	205	\$208,075
Total			\$4,602,480.00

* TCIO annual cost includes costs for staffing, operations, facilities costs (power/HVAC), space, and other related costs.

Note that these calculations do not differentiate between desktop and laptops. There is a higher degree of support required with laptops because the systems are prone to damage. Likewise the desktop count includes computer labs which have a static image, refreshed in between teaching sessions. These computer lab machines are more stable, but require more support between class sessions for refresh and reconfiguration. Balancing these inputs, the TCIO calculations shown above continue to use Gartner’s standard model.

7.0 TELEPHONES

Through the Measure B bond, new construction and building growth at Chabot and Las Positas College have expanded the number of new classrooms, offices and staff. An increase in the connectivity requirements to the current telephone systems had paralleled this building growth, requiring the addition of telephone extensions, voicemail boxes and cabling. The Measure A bond will continue that growth.

At Chabot, a Fujitsu telephone system was in production at the start of the Measure B bond. This system was configured as two separate components, one housed in the main telephone room (MPOE) in Building 200, and the other located in the Building 1400 IDF. Since the Fujitsu systems were not expandable and nearing the end-of-life, in 2007, CLPCCD ITS and Chabot Technology worked with the current telephony maintenance organization, Altura CS, to implement a minimal upgrade whereby the Fujitsu systems were gatewayed to an Avaya Communications Manager S8300 system. This upgrade positioned Chabot to begin a gradual transition of the telephone services off the obsolete Fujitsu, and onto a current Avaya platform, and allowed deployment of Avaya telephone service to new buildings such as the IOB and CSSC. During the renovation of Building 1400 in 2011, the replacement of the Fujitsu system in the B1400 IDF, was performed. This upgraded the system in B200 to an S8500, and allowed the connectivity of Building 3500, 3400, 1400, 1600, 1700, 1800 and smaller buildings which had been connected to the old B1400 Fujitsu. The remaining Fujitsu system in B200 was also removed.

The District Office telephone system was linked to the Chabot Fujitsu system for voicemail. As Chabot gradually migrated off the Fujitsu system, it became clear that the District Office system similarly needed to be replaced. When the District Office moved to the current Dublin location in 2013, its Fujitsu system was decommissioned, and replaced with an Avaya S8300 system. While using separate calling through its own in/outbound PRI service, the District Office system currently connects to the Chabot system for voicemail storage.

Chabot and the District partner with Altura CS for ongoing maintenance, upgrades and configuration changes. Moves of the telephones from one office to another in the same building can be done by the Chabot or District staff.

Another District site, the Tri-Valley One STOP (TVOS) uses a Centrex system which is also completely independent of the other CLPCCD systems. Services are limited, and require a separate support contract with AT&T. An analysis will need to be performed to determine if the TVOS system can be connected to the District system in a cost-effective manner.

Many years ago, Las Positas purchased a Siemens HiCom 300 system, and at the start of the Measure B bond expansion, it was running at 50% of its capacity. This has been a discontinued product for Siemens for several years although support and refurbished parts have been available. The system is now expanded to its maximum capacity and a full system replacement will be done under the Measure A bond. LPC has a full-time telephone administrator who looks after onsite moves. For more complex system administration and configuration changes, this system is supported by an outside service organization, contracted as-needed basis.

8. AUDIO-VISUAL TECHNOLOGY

In 2005, prior to the Measure B bond, College Technology staff provided Audio-Visual (AV) to classrooms on demand by pushing TVs, overhead projectors, VCRs and slide projectors on carts around to the classrooms as requested by the instructors. At the beginning of the Measure B bond, College Technology departments individually developed AV Technology standards for the “smart” classrooms at each campus. Beginning with the renovation of the first classrooms on each campus, the “smart” classroom was installed in every teaching room providing:

- Drop-down screens (3x4 or 9x10)
- Projectors (LED)
- Push-button SP input controllers using AV sources including document cameras, VCRs, and laptops
- Speakers
- Assisted listening devices

When buildings were constructed or modernized, AV designers were engaged as part of the architect and engineering team, to design the AV infrastructure and produce a set of drawings for the classroom construction. The construction projects included:

Year	Chabot Building	Rooms	LPC Building	Rooms
Pre-2008	B1300 B1500 B1600 B2000 B2100 B2200 B3100 B3900	2 classrooms 3 rooms 10 classrooms 2 classrooms 8 classrooms 5 classrooms 3 classrooms 14 classrooms	B2200 B800 B2500 PE	6 classrooms 8 classrooms 7 classrooms
2008	B900	5 classrooms	M&O	2 rooms
2009	B2200 Health B800 B3500	1 classroom 18 classroom 1 classroom	B2400 MD Aquatics	12 classrooms - none
2010	B700 CSSC B400 IOB B1900 Planet. B500	4 rooms 2 classrooms 2 classrooms 17 classrooms	B2300 CDC B4000 CCA B1900 IT B900	2 classroom 11 classrooms 1 room 1 classroom
2011			B400/500/600	13 classrooms
2012	B4000 B300 B1400/B1600	- none 14 classrooms 4 classrooms	B1800/1850 B1700	19 classrooms 1 room
2013	B1800 B2500, 2600, 2700, 2800, 2900 B3400 B1200	9 classrooms 12 classrooms 2 classrooms 5 classrooms	B1600 SSA	17 classrooms
2014	B1700	13 classrooms	B1310/1320 Temp 100	1 room 6 classrooms
2015	B100	5 classrooms	B2000	7 classrooms
2016			B700	2 classrooms
Totals		161 classrooms		114 classrooms

Throughout the span of the Measure B projects, the growth of smart classrooms has been:

Location	Pre-2008	2016	Growth Factor	Growth %
Chabot	47	161	2.46 times	246%
Las Positas	21	114	5.42 times	542%

The build-out of the new smart classrooms has been part of building modernization and new construction, using contractors for the installation and initial configurations to assist the College Technology staffs.

As buildings were completed, the “smart” classroom AV equipment introduced an additional level of technology sophistication to be supported by College Technology staff. In addition, the AV industry has matured and enhanced their products, and newer products have been installed in more recent building remodels. This results in a similar but heterogeneous set of equipment to be supported by College Technology staff.

The life cycle of AV equipment can be as long as 7 years, depending on the robustness of the hardware. Items that fail frequently are project bulbs and occasionally the projectors themselves. These require regular replacement for the classrooms to continue functioning. Even if equipment continues to function, AV technology is particularly susceptible to a short service life.

Ongoing support of the new AV technology was absorbed by College Technology departments. Limited training and documentation on the equipment was provided by AV contractors. College Technology staff was frequently in a position to figure out the functionality on their own, through on-the-job training. While the AV technology advanced the complexity significantly, the staffing and training in the College Technology departments did not change appreciably. For Measure A projects, there will be a focus on providing more comprehensive training at the initial installation, as well as for ongoing maintenance support.

Classrooms are demanding increased resolutions, digital technologies, support of new AV sources, and access to conferencing/collaborative tools so students can present and interact with the instructor during the lectures. AV Technology is moving towards an IT type of infrastructure with cabling, electronics, software and programming becoming increasingly similar to computer systems. Given the rising costs and the mission-critical nature of today’s AV systems on campuses, utilizing a TCO approach is required.⁹

The Gartner TCIO studies do not include an assessment of Audio-Visual technologies or staffing. Industry standards for university/college level AV staffing vary. The complexity of the AV systems in the classrooms vary from simple projection to complex collaboration, video capture and conferencing tools.

In an AV survey conducted in 2014¹⁰, the following items were compared: 1) school size, 2) AV technology sophistication and 3) number of AV classroom/conference rooms per school. A broad set of responses was received. The results of this survey were published in a number of online journals pertaining to educational support. While there was a wide variety of responses, the results of the survey indicate an average support ratio of one staff for 43 AV installations; with the room:staff ratios varying from 15:1 to 140:1. A variety of technical factors contributed to the staff levels, but the median of the survey showed a staffing ratio of 77 rooms per staff, which is the guideline utilized by CLPCCD for comparative purposes.

CLPCCD’s AV staffing as shown below:

Location	No. of classrooms	Current No. of AV support staff at Colleges (daytime)
Chabot	161	2
Las Positas	114	2

⁹ AV/IT Infrastructure Guidelines for Higher Education, Infocomm, 2014.
https://www.infocomm.org/cps/rde/xbcr/infocomm/InfoComm_AVITHighEd_Dec14.pdf

¹⁰ A Benchmark for AV Support Staff, Campus Technology, 2016.
<https://campustechnology.com/articles/2016/09/21/a-benchmark-for-av-support-staff.aspx>

*LPC has an additional .5 part time staff for after-hours AV support for faculty.

For CLPCCD, the highest ratio is about 80 rooms per dedicated AV support staff. This is within the support range found in the median of 77 rooms per staff in the industry survey. CLPCCD also has the ability to leverage the desktop support staff if extensive AV support as needed.

Since much of the smart classroom technology is reaching or exceeding its useful life, a significant project for the Measure A bond will be to design and contract the refresh of the AV in the classrooms. College Technology departments will work with AV designers in establishing - new standards to refresh existing classrooms, and become the basis of design for Measure A building projects. This will put increasing pressure on College Technology staff as they work as designers while maintaining the current installations. For Measure A, the AV requirement will need increased staff at both colleges for support of new building construction and refreshes of existing AV equipment concurrently. However, it will also allow them to become more educated on the solutions for the next generation AV installations in advance of the production environment.

9. STAFFING

As mentioned in earlier sections of this document, staff expansion has not kept pace with growth of the IT infrastructure and servers. As such, the current staff provides “best effort” response for support and project rollouts.

Gartner’s TCIO model provides staffing metrics that are calculated as part of the TCIO costs.

Resource	TCIO cost per year *	Staffing Cost Allocation	Average Annual Salary
Windows servers	\$5,662	45%	\$126,336
Linux Server	\$8,454	50%	\$142,335
Unix Server	\$27,483	35%	\$136,020
Storage	\$2,009	26%	\$131,836
Client Computing (Desktops)	\$1,015	40%	\$105,455
Data Network	\$100	43%	\$131,500
Voice Network	\$622	37%	\$122,529

* TCIO annual cost includes costs for staffing, operations, facilities costs (power/HVAC), space, and other related costs.

The details as to how the staffing proportion of TCIO are calculated are described in more detail in Appendix A. These calculations and data from peer California Colleges have been analyzed for applicability to CLPCCD. In all of the staff analyses documented below, the supervisor/management staff has not been included in the staff calculations.

College Staffing

Applying the Gartner TCIO for staffing to the College Technology departments, staffing levels for technology analysts can be calculated and compared to existing staffing levels at CLPCCD.

In addition, CLPCCD also reviewed the comparable colleges in the 2016 survey of California Community College Staffing level for desktop computer counts. The colleges in the survey with a similar count range for Chabot and LPC include Merced (275), Ohlone (228.7), Irvine Valley (236), Glendale (262.5), Cuesta (250) and Shasta (226.7) The average desktop count from the CCCD survey for the comparable colleges was 233, ranging from 226 to 275 units per IT Staff member. Prior to the Measure B Bond, the per unit ratio for Chabot was 266 and for LPC was 235, so in 2005 both colleges were within the CCCD range from the 2016 survey.

Location	TCIO cost per year *	Gartner Recommended Staff count	College Desktop/Server Staff Count
Chabot Desktop/Server	\$2,405,550	9	4
LPC Desktop/Server	\$1,984,325	7.5	3

* TCIO annual cost includes costs for staffing, operations, facilities costs (power/HVAC), building space, etc.

With the Measure B expansion, the 2016 current per unit support ratio at Chabot increased from 266 to 395 per IT staff. To lower support ratios to closer to the acceptable 266 unit ratio, the Chabot staff would need to increase staff beginning with an increase of three (3) staff. This begins to close the gap for the staffing level of nine (9) that is recommended by the Gartner TCIO model.

With the Measure B expansion at LPC, the LPC 2016 current desktop ratio increased from 235 units per IT staff to 355 units per IT staff. To lower support ratios to closer to the acceptable 266 unit ratio as Chabot, the staff for LPC would need to increase staff, beginning with an increase of two (2) staff. A .5 person staff increase is already in progress for additional evening/weekend support. This begins to close the gap for the staffing level of 7.5 that is recommended by the Gartner TCIO model.

Summarizing for support, both Chabot and LPC technology departments should be increased by three (3) staff at Chabot and two (2) staff at LPC to support the college desktop expansion already in place with the Measure B bond growth.

With Measure A bond, there will be increased computer labs and classroom technology. Significant refresh projects for the “smart” classrooms will also require College staff resources

during the design, installation and ongoing operations. Additional staff increases to support the Phase 1 (2017-2022) Measure projects are needed.

For the colleges, the server increase count was not as significant as the District server count since most of the Enterprise systems are centralized through the District servers that service all locations. For both colleges, the Gartner TCIO model staffing recommendations was .5 to .6 staff, which is a shared IT resource with desktop support staff. An additional .5 IT resource is expected to become warranted during the Measure A expansion when more virtualized servers with redundancy are added to the college server pool as has already been implemented at district locations.

Summarizing the College staffing increases for Desktop/Server:

Location	College Technology Staff Count	Proposed Growth for 2017-2018	Measure A Phase 1 Staff Increase
Chabot	4	+3	+2
LPC	3	+2.5*	+3

* Additional .5 staff head count increase is already in progress for off-hours support of one full-time staff.

District Staffing

At the District level, the server count is significantly higher, leading to the following staffing calculations:

Resource	TCIO cost per year *	Gartner Recommended Staff count	District Staff Count
Desktops	\$208,075	.78	1
Windows Server	\$288,762	1	.75
Linux Server	\$371,976	1.3	1
AIX Server	\$1,126,803	3	1
Storage	\$184,828	.4	.25
Networking	\$493,550	1.6	1
District Total		8.08	5

* TCIO annual cost includes costs for staffing, operations, facilities costs (power/HVAC), building space, and related costs.

For the District, staffing for desktop support went from .5 person to one (1) person to support 205 desktops since the Measure B bond expansion. No additional staffing increases are needed for the district support of desktops.

With the expansion of servers during the Measure B bond technology improvements, the primary increase was in the District servers which went from 31 to 136 servers, due to the increase in new application systems, Enterprise servers and redundant servers to maximize system availability. With this substantial increase in systems and servers, the Gartner TCIO model recommends 5.7 IT staff required, which is an increase of three (3) IT staff members for Enterprise systems/servers.

The network growth resulting from Measure B includes 1) expanding the services for students and staff , 2) increasing the available bandwidth and 3) an increase in network ports by a factor of three to eight times depending on the site. In all three locations, the total port count has increased from 3,048 to 10,624, which is 3.5 times the network capability. The Gartner TCIO model recommends at least 1.6 staffing compared to the current 1.0 staff for network support. Thus, due to the anticipated expansion under the new Measure A Bond, an increase of one (1) network staff is recommended to maintain the network for 24x7 coverage.

10.0 SUMMARY OF TOTAL COST OF OWNERSHIP AT CLPCCD

Through the Measure B Bond program, the Information Technology infrastructure at Chabot-Las Positas Community College District (CLPCCD) has grown substantially. The Information Technology improvements included upgrades to servers, desktop/laptop, audio-visual, wired and wireless networking and cabling infrastructure. Likewise, the Total Cost of Ownership for the expanded infrastructure has been significant.

CLPCCD did take actions to handle TCO for the Measure B expansion to reduce TCO costs and achieve productivity gains. CLPCCD District ITS and College Technology departments have been able to accommodate the infrastructure and TCO growth through a number of operational approaches:

- **Vendor Standardization:** With vendor standardization, CLPCCD District ITS reduced incompatibility issues, support issues, administrative costs and have access to new technology for prototyping. For the Measure B Bond program, CLPCCD standardized on all IT equipment for switches, routers, network infrastructure, desktops/laptops, servers, audio-visual equipment and cabling. With vendor standardization, CLPCCD also gained purchasing leverage, which resulted in attractive pricing from partners who worked with CLPCCD for a successful infrastructure implementation.
- **Product Selection –** CLPCCD District ITS and College Technology staff analyzed and selected products that would provide the greatest performance and life cycle. This includes Hewlett-Packard and IBM servers, Hewlett-Packard desktops, Cisco networking hardware and Commscope SYSTIMAX Category 6A cabling standards. This has allowed CLPCCD to extend the longevity of the equipment and maximize its investment of Measure B funds.
- **Multi-year Support Contracts with Vendors for Maintenance –** Servers, desktops and network equipment were purchased with supplier/manufacturer support. This increased the availability of parts, skilled technicians for repair and timeliness of repairs. Where available, support contracts were purchased to the end of 2017 at the end of Measure B.
- **Stable IS Organization:** CLPCCD ITS has been fortunate to maintain talented staff, many of whom have worked in the District for 10+ years. Leveraging the long-time, experienced staff, the knowledge base for deployment of new systems was comprehensive and thorough. A stable staff kept deployments consistent and focused.

CLPCCD did replace technology equipment in accordance with the unit's service life in order to ensure that the support costs does not exceed the value of the equipment, thus reducing overall TCO costs. Desktop refreshes were completed on a 4-year cycle with 25% of the desktops being replaced annually with a total of 11 refreshes completed from 2005-2016. For Windows/Linux Servers, equipment replacements were done twice during the duration of Measure B in 2007 and

2014. For the Banner Enterprise AIX servers, replacements were also done twice during the duration of Measure B in 2007 and 2012. Network equipment refreshes were completed four times during Measure B in 2006, 2009, 2012, and 2014. The wireless network rollout had no refreshes during Measure B since all the installations were new, but CLPCCD will do a total replacement of wireless with the new technology available under Measure A.

While CLPCCD District ITS and College Technology departments have been very successful in the approaches documented above, the TCO impact has not been addressed in areas of staff levels and training. Supported by Gartner TCIO analysis and peer California Community colleges, the following staff expansion is required to support the *current* infrastructure acquired through the Measure B bond projects to satisfy the gap for TCO staffing:

Staffing Expansion for Servers, Desktops, AV and Networking

Location	Actual Staff Count	Gartner Recommended Staff Count	Proposed Growth for 2017-2018
Chabot	6	9	+3
Las Positas	5.5	7.5	+2.5
District	5	8	+3

* For LPC, additional .5 staff head count increase is already in progress for off-hours support of one full-time staff.

In addition to the staff expansion, appropriate training is required to ensure effectiveness of support to staff and students. Estimated costs of these staffing increases is provided using the Gartner TCIO salary estimates and summarized in the next section, IT Action Plan.

As the Measure A projects occur, CLPCCD plans to leverage the successful approaches for equipment selection, deployment and support. Further analysis of staffing levels must be performed on a regular basis to ensure there is adequate technology support to implement the new Measure A Bond projects as additional technology expansions continue. Some of the new Measure A initiatives that will require additional staffing include: a redesign of the wireless network at the colleges and district, distributed antenna system (DAS) to improve cell phone coverage internal to buildings, cell tower installations with key providers for external coverage outside the buildings, a total refresh of all the AV smart classroom configurations, and replacement/upgrades of the telephone systems.

11.0 INFORMATION TECHNOLOGY (IT) ACTION PLAN

Information Technology projects include the Measure A bond building modernization projects and other district wide Enterprise technology initiatives. This includes the development of an updated district-wide Technology Plan that addresses the technology aspects of facilities and equipment planning and aligns with the Facilities Master Plan, the College Educational Master Plans, and the District Strategic Plan. The Technology Plan will be expanded to include ongoing review of the Total Cost of Ownership (TCO), with annual adjustments incorporated as needed to ensure that TCO costs are addressed appropriately. In coordination with the College and District Technology committees, the existing equipment and application functionality will be assessed periodically, and there will be an ongoing review of IT systems/infrastructure and the relevant TCO to ensure that systems are performing in the best manner to satisfy the College requirements.

The following TCO areas will be reviewed:

- Acquisition Costs: An analysis of industry equipment directions will indicate if new acquisitions will provide enhanced functionality and service offerings to College staff and students while taking advantage of more attractive acquisition costs.
- Hidden Costs: As equipment changes, hidden costs for facility and resource use may be modified to more optimally use building resources for better operating costs.
- Ongoing Costs: Increased maintenance costs for existing, aging equipment may drive changes sooner than equipment service or life cycle would normally demand.

All factors affecting TCO cost impacts for CLPCCD Information Technology will be regularly assessed for the optimal environment for CLPCCD users.

Key items addressed in Phase 1 of the Measure A projects will include:

- Follow guidelines for the TCO IT model for Acquisitions and Ongoing Support as was done for Measure B.
- Upgrade of campus data and cellular wireless networking. This project will replace the current infrastructure with the 802.11ac Wave 2 technology, allowing for high-bandwidth and more pervasive data connectivity on campus. Distributed Antenna System (DAS) technology will be deployed to enhance cellular reception within buildings, in conjunction with carrier tower transmission outside of the buildings.
- Addition of equipment to support Facilities Master Plan: As buildings are modernized or renovated, new desktop/laptops and network infrastructure will be procured and deployed.
- Ongoing replacements for equipment life cycle and end of service life. Using the four-year life cycle, refreshes each year will replace 25% of the installed desktop/laptop equipment. Additional equipment needed for the building modernizations will be rolled

into the four-year life cycle refreshes. Network and server expansion and replacements will be designed and procured as needed.

- Ongoing support with multi-year vendor maintenance. To provide quick problem resolution and return-to-service, support contracts for equipment will provide expertise for quick problem resolution and efficiency of operations for CLPCCD District ITS and College Technology staff.
- Replacement of Help Desk software. To provide enhanced service to the user community, new Help Desk software will be implemented, providing a searchable knowledge base to assist with rapid problem resolution.
- Staff additions to reach Gartner and peer California Community Colleges staffing ratios. The recommendation provided in the chart below projects the additional growth as needed to meet the current year 2017-2018 to address the gap resulting from the Measure B expansion projects followed by the Phase 1 of Measure A projects which covers the first five years to 2022.

The Gartner model for TCIO estimated costs are based on industry-wide average costs, and are used to determine staffing ratio levels for maintaining a stable and reliable technology environment. CLPCCD adopted this model for the TCO analysis for Informational Technology. These staffing recommendations are shown in the following chart:

* For	Location	Actual Staff Count	Recommended Staff Count	Proposed Growth for 2017-2018	Future Growth for Measure A Phase 1
	Chabot	6	9	+3	+2
	Las Positas	5.5	7.5	+2.5 *	+3
	District	5	8	+3	+1

LPC, additional .5 staff head count increase is already in progress for off-hours support of one full-time staff.

Using the Gartner TCIO estimates, the following staffing costs would apply.

Resource	2017-2018 Staff Increases	2017-2018 Estimated Costs for Staffing Growth	Measure A Phase 1 Staff Increases	Measure A Phase 1 Estimated Costs for Staffing Growth
Chabot (Desktop, Server, AV)	3	\$337,246	2	\$210,910
LPC (Desktop, Server, AV)	2	\$210,910	3	\$337,246
District (Server, Enterprise, Networking)	3	\$393,856	1	\$126,336
Totals		\$1,005,180		\$674,492

In summary, as implemented for Measure B, CLPCCD District ITS and College Technology will continue to follow and enhance the guidelines for Acquisition and Ongoing support described by the Total Cost of Ownership (TCO) for Information Technology (IT) to provide high-performing technology solutions for staff and students.

APPENDIX A**CALCULATING ANNUAL TCIO FOR CLPCCD INFORMATION TECHNOLOGY**

Each year Gartner develops a new Total Cost of Infrastructure and Operations (TCIO) report based its Information Technology Key Metrics Data (ITKMD). ITKMD is part of the Gartner Benchmark Analytics range of solutions, and offers macro level and platform-level looks at Gartner's global database of comprehensive cost and performance measures. The annually published ITKMD reports contain relevant database averages and other statistics from a subset of metrics and prescriptive engagements available through Gartner Benchmark Analytics. ITKMD consists of more than 2,000 IT cost and performance statistics.

In 2015, Gartner collected ITKMD from over 2,000 enterprises worldwide. The data collected through 2015 formed the basis of the 2016 ITKMD series of reports. ITKMD provides immediate access to authoritative data on IT staffing and investment levels, as well as key technology cost and performance metrics. ITKMD is multilevel: from macrostatistics (such as IT expenditures/employee) to platform-level statistics. These metrics support improved budget and investment decisions with regard to the changing environments of business and IT. ITKMD is collected year-round through direct fact finding in benchmarking and consulting engagements, and through surveys of the Gartner customers and at Gartner events, in addition to surveys of non-Gartner-based customers.

The Gartner model for TCIO estimated costs include both the IT operating costs and Facility building operating costs to support the equipment. This includes costs for IT staffing, IT operations, facilities operating costs (power/HVAC), space, and other related costs. These estimated costs are based on industry-wide average costs, and are used to determine staffing ratio levels for maintaining a stable and reliable technology environment. CLPCCD adopted this model for the TCO analysis for Informational Technology.

Gartner's TCIO model from 2016 assigns the costs as shown on the following table:

Gartner Costs per Platform (Categories of Equipment)

Platform	Unit	2016 Average TCIO/Unit/Year
Windows Server	No. of OS instances (installed)	\$5,662
Linux Server	No. of OS instances (installed)	\$8,454
UNIX Server	No. of OS instances (installed)	\$27,483
Storage	No. of TB (raw configured)	\$2,009
LAN	No. of ports (active)	\$100
Voice Network	No. of users	\$622
Client Computing	No. of end-user devices	\$1,015

These values have been used to quantify funding costs for the CLPCCD District and College Technology TCIO.

Note that the total TCIO for a system at CLPCCD would include the years of service available from that system. The anticipated “service life” of CLPCCD technology equipment is as follows:

- Desktop/laptop computers: 4 years
- Servers: 5-7 years
- Printers: 5 years
- Network equipment: 7-10 years
- Network cabling: 20-25 years
- Audio-Visual equipment: 7 years
- Telephony systems: 8-12 years
- UPS: 15-20 years
- Generator: 20-30 years

CLPCCD ITS and College Technology staffing assess equipment usefulness to determine life span. Innovative technology that does not exist in the industry as of yet will make the current equipment obsolete and will reduce the service life when available.

TCIO calculations shown below are an **annual cost** based on Gartner’s model.

Chabot College Servers

Chabot College has 30 servers, divided up as: twenty-eight (28) Windows servers and two (2) Linux servers. As such, the TCIO for those servers is:

Platform	2016 Average TCIO/Unit/Year	Quantity	Net Cost
Windows Server	\$5,662	28	\$158,536
Linux Server	\$8,454	2	\$16,908
LAN ports	\$100	75	\$7,500
Total TCIO			\$182,944.00

Las Positas College Servers

Las Positas College has 22 servers, configured as: twenty (20) Windows servers and two (2) Linux servers. As such, the TCIO for those servers is:

Platform	2016 Average TCIO/Unit/Year	Quantity	Net Cost
Windows Server	\$5,662	20	\$113,240
Linux Server	\$8,454	2	\$16,908
LAN ports	\$100	37	\$3,700
Total TCIO			\$133,848

District Servers

The TCIO for the Enterprise Banner server, application servers directly related to Banner access and general servers for email and web services is:

Platform	2016 Average TCIO/Unit/Year	Quantity	Net Cost
UNIX (AIX)	\$27,483	41	\$1,126,803
Linux Servers	\$8,454	44	\$371,976
Windows Servers	\$5,662	51	\$288,762
Storage (TB)	\$2,009	92	\$184,828
LAN ports	\$100	120	\$12,000
Total TCIO			\$1,984,369.00

Network Infrastructure

Local Area Network (LAN) connections in the Data Center are already included in the Server TCIO cost model. Using the Gartner mode for Data Networks, the following TCIO calculations apply:

Platform	2016 Average TCIO/Unit/Year	Number of Active Connections *	Net Cost
Chabot	\$100	2780	\$278,000
Las Positas	\$100	1,955	\$195,500
District & TVOS	\$100	200	\$20,000
Total TCIO			\$493,500.00

* Based on 2016 campus desktop and laptop counts. Does not include BYOD wireless users.

Staffing TCIO Calculations

Garner surveys the industry and compiles specific data on staffing levels and costs. These are documented as part of the ITKMD Toolkit, which is published annually. Key metrics are shown below:

Resource	TCIO cost per year	Staffing Cost Allocation	Average Annual Salary
Windows servers	\$5,662	45%	\$126,336
Linux Server	\$8,454	50%	\$142,335
Unix Server	\$27,483	35%	\$136,020
Storage	\$2,009	26%	\$131,836
Client Computing (Desktops)	\$1,015	40%	\$105,455
Data Network	\$100	43%	\$131,500
Voice Network	\$622	37%	\$122,529

Applying the Gartner recommendations to CLPCCD, the staffing requirements are calculated using the following formula:

$$\text{Net Staffing} = \frac{[\text{Platform 2016 Average TCIO/Unit/Year} * \text{No. of Units} * \% \text{ TCIO cost}]}{[\text{Salary}]}$$

Chabot College

Platform	2016 Average TCIO/Unit/Year	No of Units	Salary	% TCIO cost	Net Staffing Recommended
Desktop/Server	\$1,015	2370	\$105,445	40	9

Las Positas College

Platform	2016 Average TCIO/Unit/Year	No. of Units	Salary	% TCIO cost	Net Staffing Recommended
Desktop/Server	\$1,015	1955	\$105,445	40	7.5

CLPCCD District

Platform	TCIO cost per year	Gartner Recommended Staff count	Actual District Staff Count
Desktops	\$208,075	.78	.1
Windows Server	\$288,762	1	.75
Linux Server	\$371,976	1.3	1
AIX Server	\$1,126,803	3	1
Storage	\$184,828	.4	.25
Networking	\$493,550	1.6	1
District Systems/Servers Total		8.08	5

APPENDIX B**SURVEY OF CALIFORNIA COMMUNITY COLLEGE STAFFING LEVELS**

A request was made to peer groups at Community Colleges in California in 2016 to share the staffing levels for desktop and server administration. The data in the chart was reviewed by CLPCCD to compare staffing levels for computer and server support to other comparable colleges.

The following data was received:

No.	College	No. Of Techs	No. of Computers	No. of Servers
1	Santa Rosa Junior College	22	3500	150
2	Merced Community College	7	1925	190
3	Ohlone CCD	11	2059	170
4	Long Beach	10	4200	250
5	Irvine Valley	5.5	1300	110
6	Glendale	8	2100	125
7	Fresno	11	3300	111
8	El Camino	8 Computer Support Techs,	3200	150
		3 Help Desk Techs,		
		1 Lab support tech.		
i9	Cuesta	5	2000	130

No.	College	No. Of Techs	No. of Computers	No. of Servers
10	Shasta	7	1589	227
11	Siskiyou	3	380	30
12	Southwestern	18	4000	180
13	Chabot	6	2370	30
13	Las Positas	5.5	1955	22
13	CLPCCD District	4	205	136

Appendix VI

Acceptable Use Policies and Administrative Procedures

General Institution

**BP 3725 INFORMATION AND COMMUNICATIONS TECHNOLOGY
ACCESSIBILITY & ACCEPTABLE USE**

Reference(s):

Government Code Sections 7405, 11135, and 11546.7;
Section 504, Rehabilitation Act of 1973 (29 U.S. Code Section 701);
Section 508, Rehabilitation Act of 1973 (Federal Electronic and Information
Technology) (29 U.S. Code Section 794d);
36 Code of Federal Regulations Parts 1194.1 et seq.

The governing board shall ensure equal access to instructional materials and information and communication technology (ICT) for all and particularly for individuals with disabilities, in a timely manner.

As it relates to equally effective alternative access to instructional materials and ICT, timely manner means that the individual with a disability receives access to the informational materials or ICT at the same time as an individual without a disability, and instructional materials within a specified timeline.

The Chancellor shall establish administrative procedures to comply with the requirements specified in Section 508 of the Rehabilitation Act and its implementing regulations.

The Chancellor shall also establish administrative procedures to enable the District to lawfully manage its use of third-party social media platforms and communication to the general public via third-party social media and other education platforms.

Approved: Date

General Institution

BP 3720 COMPUTER AND NETWORK USE

Reference(s):

Education Code Section 70902;
Government Code Section 3543.1(b);
Penal Code Section 502;
Cal. Const., Art. 1 Section 1;
17 U.S. Code Sections 101 et seq.

Employees and students who use District computers and networks and the information they contain, and related resources have a responsibility not to abuse those resources and to respect the rights of others. The Chancellor shall establish procedures that provide guidelines to students and staff for the appropriate use of information technologies. The procedures shall include that users must respect software copyrights and licenses, respect the integrity of computer-based information resources, refrain from seeking to gain unauthorized access, and respect the rights of other computer users.

The computing facilities of the Chabot-Las Positas Community College District are provided for the use of students, faculty, and staff in support of the programs of the Colleges and District. The computer systems of the District are provided solely for the following purposes:

1. use by authorized employees and agents of the Chabot-Las Positas Community College District for District business;
2. use by authorized employees of the Chabot-Las Positas Community College District for professional activities related to the employee's job function;
3. use by registered students or authorized employees of the Chabot-Las Positas Community College District for instructional activities; or
4. public access to approved District or College information resources via the public telephone and data networks.

The District acquires a substantial portion of its computer software from vendors under license agreements which restrict the use of the software to specific computer systems and which require the District to limit the use and copying of the software. It is District policy to comply with the terms of these licenses and with copyright law. Use of District

computer resources in violation of copyright restrictions or software license terms is prohibited.

The District's computer systems, including hardware, software, and all computerized information and data are owned by the District or are licensed from vendors under license agreements. Except as provided in Board Policy pertaining to intellectual property rights, employees and students have no rights of ownership to these systems or to the information they contain, even if the employee or student entered the information into these systems. Employees may use this information only as directed in the legitimate business of the Colleges and District and only as prescribed by Board Policy 5540.

In order to facilitate proper and responsible use of computers, the Chancellor shall establish rules and regulations for all users of District computing facilities. All users must comply with these rules and procedures; violations may result in revocation of system access privileges and may have additional consequences including termination or expulsion. Such rules and procedures would include, but are not limited to, tampering, interference, damage and unauthorized access to lawfully created computer data and computer systems.

Adopted: August 18, 2015

(This new policy replaces the CLPCCD Policy 2311)

Appendix VII
District Office Technology Plan Consolidation Completion Plan Dates

District Office Technology Plan Consolidation Completion Plan Dates

Project Name	Spring 2022	Summer 2022	Fall 2022	Spring 2023	Summer 2023	Fall 2023	Spring 2024	Summer 2024	Fall 2024	Ongoing
Life-cycle Management of Staff Systems										X
Life-cycle Management of Servers										X
Migration of Faculty and Staff email to Office 365 (O365)			X							
Single Sign On (SSO)			X							
Integrate Multifactor Authentication with O365				X						
Integrate Multifactor Authentication with VPN		X								
Distributed Antenna Systems (DAS)										X
Core Switch Upgrade							X			
Complete Migration to Banner 9				X						
AIX Infrastructure			X							
Upgrade to Oracle 9C				X						
Ellucian CRM Advise			X							
Ellucian CRM Recruit			X							
Ellucian Degree Works				X						
Upgrade Self-Service Banner (SSB)				X						
Portal (Revision 1)			X							
Portal (Revision 2)				X						
Ad Astra Course Scheduling		X								
Analyze Student Registration Processes and Technologies				X						
Hybrid-Flexible (HyFlex Classrooms)										X
East Bay College Agile Network (EBCANN) Partnership										X
CVC-OEI Home/Teaching College				X						
Augment the District IT Governance Structure for Prioritizing IT Enhancements				X						
District-wide Vaccine Mandate										X
Update Information Technology Total Cost of Ownership (TCO) Plan				X						
Five-year "Look Ahead" Model				X						
Training Materials for New Faculty and Staff				X						
Zonemail Storage Requirements			X							
Online Forms			X							
Implement Social Media Procedures			X							
Security Awareness Program			X							
Acceptable Use Policies and Administrative Procedures (3720 and 3725)		X								
Office 365 Training										X
Server Hardening										X
Cloud Storage for Server Backup System				X						