APPENDIX 9.1

RECOMMENDATIONS FOR MINIMUM STANDARDS IN CLASSROOMS & LABS

TECHNOLOGY
Recommendations for Minimum Standards In Classrooms & Labs

August 9, 2005
Draft – v2.0

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1. Executive Summary

Alfa Tech was engaged to aid the District in developing technology standards for classrooms and labs which would be a basis for the campus infrastructure upgrade and provide a technology strategy for future changes. This document is the draft version of that recommended plan, containing various recommendations and actions categorized within specific segments. It will be further and reviewed for finalization in October by the Board of Trustees.

It is important to note that the categories within these recommendations should be considered “building blocks” wherein there are prerequisite items that are needed for the success of subsequent solutions. For instance, various items can be considered to be infrastructure and, as such, are the foundation upon which all other solutions rest and ride.

Likewise, there is a category of non-technology prerequisites – these are items that, while not technology-related items, could have a significant impact on the success level of the technology plan. Items such as the general commitment to staff training and staffing levels are contained in this section so as to highlight factors that it is recommended be addressed in with the technology-related items.

Based upon a high consensus of feedback during workshops held with District staff, an overriding theme arose and has been used as a guiding principle throughout this recommended plan; the concept of “focus on the students with high tech that allows for high touch” has been utilized to guide the recommendations. It is the position of Alfa Tech that students and their associated learning experience is the “product” of the District. As with all business pursuits, the primary goal of any attempt should lead to the satisfaction and betterment of product delivery. As such, this recommended technology plan incorporates items that we believe indeed lead to that goal -- for it is our opinion that inefficiencies, ineffectiveness, and otherwise impeding items related to technology are indeed hampering the ability to focus on students. The technology recommendations herein contain certain items to remediate inefficiencies and, thereby, increase effectiveness and enable an improved focus on students.

Likewise, it is our philosophy that technology should be used as an enabler toward the overall betterment of the delivery of services to students. The benefit of improving administrative efficiencies coupled with enhancing the way students interface with the district by leveraging technology allow the focus on students under an ever-restricting staffing model.
In general, the proposals within this document are of a strategic nature and include recommendations that the district should pursue in achieving a particular technology item. For instance, there is an example of technologies that could be utilized in the classroom environment, but the unit specifications, vendor or model numbers are not specified. Before that can occur, there would need to be a general buy-in to the Goal, Strategy and Actions that would allow the specifics to be noted. The various recommendations within this document may vary in their depth into a particular topic – for those areas where definition is clear, more definitive recommendations have been made.

The next steps in this process include review, comment, and approval by the district staff, the Technology Committee, the President’s Council and the Board of Trustees. Specific sub-projects will need to be scheduled based on the priority of the items that can be achieved with the bond funding.
2. Mission Statements

The use of mission statements is designed to ensure alignment and cohesion with key overarching goals and objectives when developing subordinate plans and support activities. The two mission statements cited herein are: 1) the overall District Mission Statement and 2) a draft of the Technology Mission Statement.

2.1 District Mission Statement

In an environment that nurtures creativity and intellectual curiosity, Gavilan College serves the community by providing a high quality learning experience and preparing students for higher education, technical and public service careers, life-long learning and participation in a diverse global society.

Source: Gavilan College Educational Master Plan February 23, 2001

2.2 Technology Mission Statement

Mission: As stated in Gavilan College's Strategic Plan, the Institution values "maintaining excellence in the arts, sciences, and technical/public service programs and promoting student success."

In the specific area of technology, Gavilan has committed "To lead in the application of appropriate educational technology" by developing "the community, instructional, and institutional potential of Gavilan College television and distance education," by leading "the region in public access educational television," by promoting "electronic literacy and access," by establishing and maintaining "efficient campus telecommunications and data processing services to support research and development," and by using "innovative technological facilities, resources, and ideas to enhance student learning."

Draft August 27, 2001
3. Non-Technology Prerequisites

3.1 Training

Throughout all the workshop interviews, training for faculty, adjunct staff and administrative staff was highlighted as a key requirement. Many anecdotal comments were made to indicate that virtually no training on technology-related tools was provided to new staff members and virtually no ongoing organized development activities exist for current staff. Likewise, there is no consistent minimum skill set requirement for new hires. Minimum and desired technology skill levels must be addressed through:

1. New hires should adhere to a minimum set of technology knowledge and experience.
2. New hire orientation should include an introduction to the technologies in use at Gavilan.
3. On-going and organized technology training for existing staff should be developed to bring the staff up to the minimum skill level required to use the existing technologies.
4. As new technology is introduced, it must also include an introductory training program and be inserted into the ongoing training.

In general, it is recommended that a firm commitment to providing the staff with necessary technology-related skills be required so that investments in technology are protected and maximized.

3.2 Staffing

While uniformly recognized as being capable and competent for the job at hand, the staff within MIS is further recognized to be overburdened with day-to-day support requirements, leaving little time for focus and attention to strategic initiatives. It is important to note that this is not an a-typical situation within any organizational entity; quite typically, day-to-day technology-related requirements consume more time than what is available.

It is recommended that an in-depth analysis be conducted to determine the appropriate structure and levels of staff allocation. It is clear that some quantity of staff must be added to MIS. MIS resources will be consumed with the ERP and the renovation projects underway.
Although additional program related staffing is being considered for the duration of the ERP project and a full-time web master will be hired to replace a contract web master, consideration should be made to augment existing staff with at least program related staffing for the classroom and lab implementation.

In addition to evaluating staffing, as suggested in the Initial Findings Report a clear agreement on provided services and Service Level Agreements should be reached between MIS and the District. This should include the identification of “key” or “power” users in the other departments who can act as technology role models and mentors for their peers.
4. Industry Trends / Emerging Technologies

4.1 Convergence – The Driving Force

Within the technology industry, swift advancement toward the convergence of multiple previously segregated environments is proceeding. Traditionally, environments such as the data network, the voice network, A/V networks, building management systems, security and surveillance systems, and other such arenas were constructed in a physically segregated manner, each requiring its own series of infrastructure components. Current deployments of these environments are proceeding in a converged manner, wherein the physical infrastructure to support each environment is converged such that they all “ride” the same physical-layer infrastructure. The data network (cabling, switches, routers, hubs, etc.) has become the core physical layer infrastructure in which all of these environments now co-exist. Telephone sets and PBX switches are now “IP enabled” wherein they are connected to the data network rather than a separate voice network. Surveillance and security systems are now designed such that they distribute control and camera-feed visual information via the data network – with the added benefit that cameras themselves receive their power over that data network (“power over Ethernet”), further reducing infrastructure investments.

The main benefits of convergence are flexibility and cost. With the need to install only one physical infrastructure to support all converged environments, cabling costs are reduced for both application-specific needs (e.g., no need for CCTV cable, voice cabling, etc.) as well as electrical power feeds (power over Ethernet). Flexibility is greatly enhanced as devices can easily be moved from one physical location to another, requiring only a data network connection at the destination, and eliminating all “back end” rewiring and/or reprogramming to accomplish such device moves.

A move toward a converged environment is incorporated throughout this proposed technology plan so that the District can reap the substantial benefits there from. Specifically, section 5.2 contains specific actions for the establishment of convergence-related standards along with the subsequent application of those standards.

4.2 Accessibility and Personalization

With the infrastructure driving towards convergence enabling the transport and storage of data and information across a common platform, accessibility of information and services is expected to be available everywhere, anytime and personalized. The newest generation of Internet portals sport the latest browser interfaces and perform amazing technological feats of access, integration, aggregation, analysis and collaboration.
The need for installing applications and clients on a desktop or laptop is diminishing as the browser takes over the role of providing access to information and applications.

This is an efficient model because it allows for better control and management in a centralized environment. There is less need for updating application and client software on remote desktop and laptop computers. It allows for more flexibility for the users as their needs change. Their profile can be changed as required providing them access to new resources. Workflow products can help automate the changes greatly reducing or eliminating the manual Operator changes.
5. Technology Dependencies

Although the focus of this evaluation is on the minimum standards for classrooms and labs, the capabilities and availability of those areas are dependent on the core and infrastructure. In this section we will address the backend services that the classrooms and labs will rely on.

5.1 Infrastructure Physical Locations

5.1.1 Intermediate Distribution Frames (IDF’s)

Goal: Intermediate Distribution Frames (IDF’s) are the distribution points between data centers and workstation locations. Generally, IDF’s are considered to be floor serving and provide a secure and environmentally controlled area for installing communications equipment, infrastructure cabling and supporting electronic equipment. The IDF receives backbone feeds from data centers and distributes telecommunications services to each individual work area location.

Strategy: Every building should be served by at least one IDF, with a minimum of one IDF per floor. A maximum cable length of 295 ft. (55 meters if 10GB over Category 6 is desired) is allowable between the IDF and the workstation – to best achieve this and keep to one IDF per floor, the IDF should be located as close as possible to the center of the building or floor being served. If the distance limitation cannot be achieved for all work area locations, an additional IDF must be provided. In multilayer buildings, the IDF’s should be stacked for facilitating connectivity between the IDF’s and from the data center (or other main building entry point for backbone services).

Actions: The size requirements for IDF’s are based on usable floor space served by each IDF. An IDF serving an area of between 5000 and 8000 square feet should be roughly 10 ft. X 9 ft. in size.

- The minimum ceiling height of each IDF should be 8 ft. above finished floor.
- The IDF should have fully opening, lockable doors that are 3 ft. wide by 80 in. tall.
• In the IDF, provide the minimum fire protection and detection required by local codes.

• A minimum floor loading of 50 foot pounds per square feet is required.

• Provide a minimum of 50 foot candles of light, measured 3 ft. above the finished floor. Locate light fixtures a minimum of 8.5 ft. above finished floor.

• A minimum of two dedicated nonswitched 3-cable 120 VAC duplex outlets, each on separate branch circuits are required. Separate duplex 120 VAC convenience outlets located a minimum of 6 in. above finished floor, placed at 6 ft. intervals around the perimeter wall are required. If available at least one outlet should be on normal power and one outlet on emergency power.

• Line a minimum of two walls with AC grade or better, void free ¾", fire treated plywood. Install plywood with grade C surface facing the wall.

• Continuous and dedicated environmental control 24/7 is required for each IDF. The temperature range should be 64°F to 74°F and the relative humidity range should be 30% to 55%.

5.1.2 Data Center

As documented within the initial findings report published on May 19, 2005, there are multiple issues and concerns with the existing data center, leading toward an evaluation of risk that is relatively high. The Data Center is the core for technology-related services and is best enabled to provide these services when the physical components of the Data Center are such that protection over the technology-related infrastructures are optimized; current conditions are simply not so.

Goal: Establish standards and documentation for a core and centralized data center environment that will protect the informational assets of the District at appropriate levels.

Strategy: Well designed Data Center environments will enable the District to rest easier in the knowledge that an appropriate investment has been made to protect the informational assets upon which the District
relies. Deployment of new and improved application environments will be predicated upon the establishment of appropriately protected Data Center environments.

Action: Establish standards for informational asset protection as related to the physical layers of a Data Center environment. Determine subsequent actions to remediate or replace the existing environments with appropriately designed protections.

5.2 Convergence

Convergence has emerged within the industry as the core for infrastructure – the specific recommendations provided herein are designed to provide for the capability to leverage convergence to achieve the benefits as described within the narrative section of this document.

Goal: Establish standards and documentation for an infrastructure that enables the integration of voice, data A/V, surveillance, building management systems, and other applicable environments to enable the ability to leverage historically segregated systems into an integrated environment, thereby reducing total cost of ownership while simultaneously streamlining operations and increasing capabilities.

Strategy 1: Converged and integrated environments will enable a higher level of overall effectiveness. Before any application can be evaluated for inclusion in a commingled environment, the infrastructure upon which it would function must first be established.

Strategy 2: Determine candidate environments for a converged existence so as to focus the bulk of effort onto those environments which are candidates for convergence.

Action 1: Establish a physical layer infrastructure (e.g., data network cabling and supporting electronics) that is capable of supporting a converged environment.

Action 2: Establish a logical layer infrastructure (e.g., V-LAN’s) applicable to the converged topology.
5.3 Common Computing Environment

As discussed in the Industry Trends/Emerging Technologies section (Section 4) of this document, accessibility and personalization are the drivers for consolidation and standardization of a common computing environment.

Goal: Offer more flexibility to students and faculty by allowing them to work when and where they need to.

Strategy: Leverage the ERP decision to establish standards for server hardware, platform and storage across all applications and environments. This will allow the MIS department to focus their skills on a specified set of technologies and hardware and become more proficient.

Strategy 2: Adopt a centralized management mentality for department applications. This would mean that the server version of future licenses should be purchased rather than individual-use licenses wherever possible. The cost per license will be higher but that should be offset by administrative benefits and student/instructor flexibility. Because the licenses are shared from a central environment checked out when needed, it is possible that a lesser number of licenses would be required. Administratively, the college should expect that it would gain better license management, better patch management, and better upgrade management. The students’ and instructor’s satisfaction and productivity should be increased given the flexibility to use the licenses where they need them rather than from a fixed environment.

Action 1: Complete the ERP selection project and determine whether the technologies that the ERP package uses can be set as a standard across the District.

Action 2: Change the standards for software purchases to include the requirement that it should be able to execute from a centralized server.

Action 3: Select and implement a centralized license server.

Action 4: Inventory desktop and departmental software and determine what can be leveraged from the Common Compute Environment.
5.4 Mobile Computing

Mobility has emerged as a key trend to leverage technology to enable the more efficient and effective use of peoples time. It is recommended within this strategic plan that certain technologies that enable a more mobile workforce and student population be established. The existing network infrastructure provides wired access in many classrooms, but little to no wireless access except in a few key “hotspots”, such as the cafeteria and library.

The issue of data security is significant and a genuine concern. The administration’s goal of maintaining network security and protection of the data is mandatory, but at first look it is in direct conflict with the student’s desire to be able to connect anywhere on campus. Security will be addressed in Section 5.6.

5.4.1 Virtual Private Networking (VPN)

Goal: Establish facilities to enable staff (and potentially students) to access the computing environment from locations not physically connected to the District network. Utilize client-level Virtual Private Networking (VPN) capabilities to allow staff to securely log into the District network from home and other locations (typically using a high-speed connection) via the Internet and experience access and functionality just as if they were physically attached to that network (e.g., at their desk).

Strategy: Mobility is a key to enabling streamlining of operations and, thereby, providing better ability to fully focus on students. Users should not be restricted to conducting their tasks to only those locations physically attached to the District network.

Action 1: Investigate the security-level requirement for VPN access methodologies. Evaluate alternatives. Select applicable alternative. Implement.
5.4.2 Laptop Use

Goal: To provide for the utilization of personally owned (students, faculty, staff, etc.) laptop computers connected to the District network. Security, virus, intrusion, and other issues must be considered so as to protect the District environments from potential harm.

Strategy: Allow those who own their own laptop computers to connect to a protected and segregated District network to interface with District services.

Action 1: Fully evaluate methodologies for allowing the connection of personal owned laptops to the District network. It is advised that, for students, specific connection points be established which are segregated from the production network (e.g., physically, via VLAN, via DMZ with VPN client accessibility, etc.).

Action 2: Ensure virus (and other) protection between the connection points available and the production District network.

Action 3: Establish formalized policies, procedures, and configuration instructions such that the use of personal laptops, while allowed within the confines of the established controlled environments, is not a function supported by District personnel.

Action 4: Select the appropriate alternatives. Implement.

5.4.3 Wireless Network Access

Goal: Attract and retain students by providing them with increased flexibility to access campus technologies and the public Internet through wireless access and the use of personal-owned laptops.

Strategy: Design and deploy a wireless solution for students and staff that allows unrestricted access to public resources and securely limits and restricts access to District technology-related services to those with the proper access rights.
Action 1: Evaluate alternatives for wireless deployment that is compliant and compatible with 802.11b/g standards – to include “traditional” deployments (e.g., multiple wireless access points distributed throughout the campuses) along with hybrid deployments (e.g., single antenna solutions providing coverage over a broader range than traditional methods).

Action 2: For either deployment methodology, investigate the appropriate methodology for connecting such devices.

Action 3: Implement.

5.4.4 Web-based Technologies

Goal: Increase use and access to web-based capabilities by web-enabling existing applications to the fullest extent possible and ensuring future applications contain web-enabling capabilities.

Strategy: Web-based capabilities depend less on desktop or Operating System dependent applications, thereby increasing the potential audience size of the application, information, or other communication intent.

Action 1: Establish standards surrounding portal-based methodologies for access to applications and information.

Action 2: Utilize role-based authentication strategies such that access can be granted based on categories of users rather than specifically user-by-user.

Action 3: Include access for Education-related as well as student and administrative-related requirements.

Action 4: Establish self-maintained departmental web pages and portals.

5.5 Distance Learning

It was observed that Distance Education is being utilized heavily in some disciplines and less so in others. It was further observed that not all academic disciplines had the same understanding of the capabilities and effective use of this important tool. In general, it is recommended that this capability be expanded to additional academic disciplines, with the requisite training provided.
in not only the tool but, more importantly, the effective use of the tool to provide a quality experience to the student.

Goal: Increase capabilities for and access to Distance Education, integrating with A/V environments. More and more students are requesting distance educational opportunities – and that desire should be satisfied. As with most technology-related initiatives, the use of distance education capabilities increases the ability serve more traditional educational experiences.

Strategy: Distance education shall increase in deployment and utilization for the foreseeable future. Enhancing methods for receipt of distance education shall serve to increase access to the learning experience and enable the ability to reach a broader and more diverse audience. Distance education is, by comparison, a lower-cost method for delivering the learning experience, providing a high return on investment.

Action 1: Continue the investment in Distance Education toolsets; including video conferencing and web casting.

Action 2: Provide training to faculty on both the technology but, more importantly, the best practices of distance education so as to ensure the quality of the experience for the student remains high.

Action 3: Integrate A/V systems into the distance education program so as to provide real-time and/or recorded instructor sessions.

Action 4: Integrate Smart Classrooms into the distance education program so as to enable real-time instruction into multiple physically separated classrooms.

Action 5: Closely tie these recommendations with section 5.2 Convergence so that the appropriate infrastructure components are established to support these actions.

5.6 Security

Assets of an organization have been traditionally defined as physical items. From the technology standpoint, this includes network hardware, computers, telephone systems, etc. However, information is also a key asset of an organization. Establishing security mechanisms and technologies to protect both of these asset categories is of strategic importance. It is important to note that training on the basics and specifics of Security is equally important and recommended.
5.6.1 Information Security Officer

Goal: In order to ensure consistency of the application and monitoring of security-related items, a single individual should be designated as the District-wide Information Security Officer.

Strategy: Consistency in the application and monitoring of security-related items within the confines of technology-related arenas is key to attaining an adequate overall level of information security.

Action 1: Establish expectations, a role definition, and reporting structures for the Information Security Officer.

Action 2: Evaluate candidates to fulfill the role.

Action 3: Designate the selected candidate.

5.6.2 Network Segregation

Goal: Certain academic departments have specific needs which, if commingled with the production environment, present opportunity for damage to either environment due to necessary activities on the other. This could include academic requirements as well as IT-related test environments. Each segregation-requiring environment should be enabled with protections from harm to or from other such environments.

Strategy: While convergence includes the strategy to commingle as many environments as possible, there remain instances where physical segregation is still required; these environments as well as the production environment should be structured in a way that optimizes each.

Action 1: Each computing environment must be fully identified and fully evaluated to determine requirements for segregation.

Action 2: Provide for such segregation either through complete physical separation or other means as deemed appropriate to each discipline and requirement set.
5.6.3 Single Source Authentication

Goal: Establish a single source for electronic authentication and certification for access to District technology resources.

Strategy: Single source authentication reduces administrative burden and better enables a common computing experience for students, faculty, and staff, all of which better supports the mission of the District.

Action 1: Establish standards for single source authentication, identifying potential candidate solutions (e.g., Microsoft LDAP or other such identity management services).

Action 2: Evaluate impacts on the various existing and proposed District systems, ensuring that the goal of single source authentication can actually be met.

Action 3: Determine disposition of applications for which no single source authentication solution can provide utility.

Action 4: Implement single source authentication.

Action 5: Establish standards such that all new application procurements must have, as a defined requirement, the ability to utilize the implemented single source authentication solution.

5.6.4 Desktop Virus Protection

Goal: Establish a consistent application and methodology of ensuring that district computing systems are protected from viruses.

Strategy: Viruses evolve quickly and spread throughout the computing world with ever-increasing swiftness. A consistent approach at the desktop provides a vital level of protection.

Action 1: Establish standards for desktop virus protection, identifying potential candidate solutions.

Action 2: Evaluate impacts on the various District systems, ensuring that the goal of consistent virus protection can actually be met.

Action 3: Determine disposition of District systems for which consistent virus protection cannot be met.
Action 4: Implement the virus protection plan.

Action 5: Establish standards such that all new system procurements must have, as a defined requirement, the ability to utilize the implemented virus protection solution.

5.6.5 Physical Security

Goal: Ensure the appropriate level of physical security for district computing systems to protect them from damage, theft, and other physical incidents.

Strategy: Electronic measures are critical to the security of the computing environment. However, physical security is equally important to the protection of the physical and informational assets of the district.

Action 1: Establish standards for the physical security of desktop systems, computing facilities, Smart Classroom resources, and other technology-related assets.

Action 2: Evaluate impacts on the various District systems, ensuring that the goal of physical security can actually be met.

Action 3: Determine disposition of District systems for which physical security protection cannot be met.

Action 4: Implement the physical security protection plan.

5.6.6 Network and Data Center Security

Goal: Ensure the appropriate level of facilities (electrical, HVAC, etc.), protections, and accesses to network and data center facilities.

Strategy: Technology investments require maintenance and support, not only in the form of warranty support contracts, but also in the form of appropriate facilities that are secure from unauthorized access.

Action 1: Establish standards for the Network and Data Center facilities and security.

Action 2: Implement the standards.
5.6.7 Data Security

Goal: Remain in compliance with statutes and other requirements related to the security of data residing on district computing systems

Strategy: Information is an asset of the district, having value just as physical assets. The protection of the informational assets of the district is a key mission of the technology department.

Action 1: Establish standards for the security of data contained within district computing systems.

Action 2: Evaluate impacts on the various District systems, ensuring that the goal of data security can actually be met.

Action 3: Determine disposition of District systems for which data security protection cannot be met.

Action 4: Implement the data security protection plan.

Action 5: Establish standards such that all new system procurements must have, as a defined requirement, the ability to adhere to the implemented data security standards.
6. Classrooms and Labs

For the purposes of this document, a classroom provides the capability for instructor led learning. It does not provide for hand-on or interactive participation between the students and technology. The term “Smart Classroom” has been used to describe a classroom which includes technology that allows the instructor to incorporate multi-media content into the learning environment; specifically audio, video, and presentation projection. The multi-media content could be available from a number of sources; the public Internet, campus servers, live TV, DVD/VCR, a computer or a flash drive. Smart Classrooms require the ability to be “connected” to the infrastructure and services discussed in Sections 5.2 Convergence and 5.3 Common Computing Environment. Those sections dealt with a developing a common platform for use by the actual devices in the classrooms, whether that device is a computer a projector, a camera, etc.

Labs also require connectivity to campus services such as shared application software, printing, publishing, and storing of documents. In an instructional lab environment, there is also the need for controls by the instructor to manage the student environment. They might need to demonstrate something that can be viewed by the students at their workstations or on a centralized monitor. They might also need to monitor what the students are doing at their individual workstations. These actions require the same connectivity required in a classroom, but with more access points.

Simply stated, connectivity is the minimum standard for all classrooms and labs. Services, capabilities and specific curriculum needs will change over time and will utilize the common thread of connectivity.

6.1 Minimum Standards for Classrooms and Labs

Goal: Accommodate today’s needs and allow for future growth as technology evolves and becomes more commonplace in the learning environment.

Strategy: Take advantage of the campus renovation to lay the foundational pathways and backbone cabling infrastructure for the classrooms and labs.

Action 1: In conjunction with the building renovation plans, develop the cabling and pathway blueprints with consideration for classroom layouts as described in section 6.3 Classroom Layout Considerations.

Action 2: Adopt the Cabling Infrastructure Standards as outlined in Section 6.2.
6.2 Cabling Infrastructure Standards

The cabling infrastructure connects the work area location to the communications equipment. It is recommended that the District establish standards that adopt the highest quality/capability cabling infrastructure available so that both current and future capabilities can be maximized. Many circumstances would not warrant this level of investment, but the fact that the District shall remain in its current facilities beyond 5 years and would prefer to leverage the newly installed infrastructure for at least that time warrants this level of investment.

Goal: Provide a cabling infrastructure that enables the maximum lifetime of the product so as to delay reinvestment as long as possible while leveraging current and future technologies.

Strategy: Install the highest capable cabling infrastructure currently available, staged to leverage current and new technologies.

Action1: The horizontal cabling shall consist of Category 6 unshielded twisted pair cable installed between the IDF and each work area location. Fiber optic and multipair copper backbone cable shall be utilized to connect the Equipment Room (Main Distribution Frame - MDF) to each IDF.

Action2: IDF locations may require redesign so as to accommodate the highest capabilities of Category 6 cabling. If 10GB speeds are desired, current limitations are 55 meters from IDF electronics to the end station. If lower speeds (albeit at higher quality due to the Category 6 cabling) are acceptable, then the 100 meter limitation can be maintained.

6.3 Classroom Layout Considerations

The layout of the classroom is critical in making it functional for the teacher and the students. Since classrooms will continue to be used for traditional instruction, the front center of the room needs to accommodate whiteboards, screens, open space for displays and experiments, and physical space for the instructor. There needs to be adequate space to use the whiteboard while images are shown on the screen. A 25 foot deep room with 25 seats needs 9 feet in front; a 35 foot deep room with 70 seats needs 11 feet in front, and a 45 foot room with 180 seats needs 15 feet in front.
As technology components are expected to be added to the classroom, the addition of a lectern/media cabinet should be added to house and consolidate the components. The location of the lectern should be planned as the termination point for power and network access and should be placed a the right or left of the room so that it is not in the way of the instructor as s/he moves around or in the way of the images on the screen or the whiteboard. The arrangement is similar to slide presentation, where the speaker is at the podium on one side of the room and faces the audience while the visuals are shown on a screen in the center of the room. The instructor can control the images from the lectern or through the use of a wireless mouse and keyboard. The lectern should be of a simple design that allows the instructor to plug in his/her laptop to power, network and projection.

Lighting should be designed so that it is parallel to the front of the room to allow for some control for four lighting zones: (1) Back row; (2) Center seating area; (3) Front presentation area; and (4) Lectern lights. Controlled light is necessary for readability on the whiteboard when used with computer materials projected on the screen. Prevent ambient room light and glare from washing out images on screens through the use of parabolic louvers. During projection, room light should be bright (30-40 candles) for student interaction, not just dim for note taking. When lights in the student zone of the classroom are turned on, no more than 3-5 foot candles of ambient room light should fall on the screen. This requirement tends to preclude indirect lighting.

Reduce ambient sound rather than trying to overcome the noise with microphones. Acoustical treatment should address concerns of reverberation time and ambient noise. Ideally, classrooms should have reverberation times in the range of 0.4 – 0.6 seconds and noise levels should not exceed NC 25 to 30. Quiet ventilation, electronic fluorescent light ballasts. Add generous sound absorbing material to minimize the need for voice amplification in standard size classrooms. When an instructor does need sound reinforcement in a classroom, a microphone and amplifier can be added to the lectern. Mount speakers for computer, CD and television sound in the ceiling near the front of the room. Ceiling mounting helps contain the sound in the room. In large lecture halls ceiling speakers around the room and an amplifier are necessary for voice, CD, TV and computer sound.

A wall mounted panel or a control panel on the podium should contain all the controls that the instructor should required to switch between technology components such as the VCR, DVD, or projector and to adjust the room lighting.
Screen sizes for each of the classrooms should be based on room depth and seating capacity. In larger rooms, consider multiple smaller screens or add one or two screens on either side of the one center screen. Sometimes a classroom will lend itself to an additional corner screen at a 40 degree angle. Be sure to plan for screen size changes in the future as newer technologies are becoming more standard. Screens today are slightly rectangular in a 3 units high x 4 units wide ratio. A new 30% wider proportion of 3 x 5.3 for DVD and HDTV will need to be accommodated in the future.

Use the guide below for determining the size and placement of the screen in the classroom.

<table>
<thead>
<tr>
<th>Room Depth</th>
<th>Seating Capacity</th>
<th>Center of Screen to Rear Corner Seat</th>
<th>Screen Req’d</th>
<th>Approx. Diagonal</th>
<th>Min. Mounting Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 25’</td>
<td>25</td>
<td>Less than 30’</td>
<td>6’ screen (72”w x 54”h)</td>
<td>7.5’</td>
<td>8.5’</td>
</tr>
<tr>
<td>25’–30’</td>
<td>25–50</td>
<td>Between 30’ and 35’</td>
<td>7’ screen (84”w x 63”h)</td>
<td>8.75’</td>
<td>9.25’</td>
</tr>
<tr>
<td>30’–35’</td>
<td>50–100</td>
<td>Between 35’ and 40’</td>
<td>8’ screen (96”w x 72”h)</td>
<td>10’</td>
<td>10’</td>
</tr>
<tr>
<td>35’–40’</td>
<td>100–150</td>
<td>Between 40’ and 45’</td>
<td>9’ screen (108”w x 81”h)</td>
<td>11’</td>
<td>10.75’</td>
</tr>
<tr>
<td>40’–45’</td>
<td>150–210</td>
<td>Between 45’ and 50’</td>
<td>10’ screen (120”w x 90”h)</td>
<td>12.5’</td>
<td>11.5’</td>
</tr>
<tr>
<td>45’–50’</td>
<td>210–275</td>
<td>Between 50’ and 55’</td>
<td>11’ screen (132”w x 99”h)</td>
<td>14’</td>
<td>12.5’</td>
</tr>
<tr>
<td>50’–55’</td>
<td>275–400</td>
<td>Between 55’ and 60’</td>
<td>12’ screen (144”w x 108”h)</td>
<td>15’</td>
<td>13’</td>
</tr>
<tr>
<td>55’–60’</td>
<td>400–500</td>
<td>Between 60’ and 65’</td>
<td>14’ screen (168”w x 126”h)</td>
<td>17.5’</td>
<td>14.5’</td>
</tr>
</tbody>
</table>
Mount television sets 52” above the floor. The student sight line to the TV screen should be the same as the sight line to the teacher’s head. This places the center of the screen approximately 60” above the floor and a comfortable viewing angle for the student. This also places the controls within reach of the instructor.

Mount video/data projection units in the ceiling. The distance from the projector to the screen should be 2 times the width of the screen.

**6.3.1 Optional and Add-On Classroom Technology**

**Goal:** Make technology use in the classroom as simple, friendly and non-intimidating as possible. Installations must serve the faculty well, yet remain affordable.

**Strategy 1:** Leverage the classroom infrastructure which has already been defined as the Minimum Standards for Classrooms and Labs by developing a “plug-in” approach to the design so that technology components may be added as necessary without having to rework the infrastructure already in place.

**Strategy 2:** Enable faculty, outside of class, to prepare text, charts, graphs, and complete desktop presentations and to practice the presentation as often as necessary. They need to be confident that everything will work in the classroom without assistance and with minimum set up.

**Strategy 3:** Rather than outfitting each classroom and each full-time faculty member with a desktop computer, purchase laptops for full-time faculty members and a loaner pool of laptops for those part-time or adjunct faculty members who need one. Most faculty would feel more secure if they could plug in their own laptop and know that everything has been prepared in advance and will work. This would also reduce the number of desktops that would be needed for each physical classroom and each faculty member. The faculty member’s laptop can also be used during lecture to see what is being displayed to the class without the teacher turning around to look at the large screen.

**Strategy 4:** A lectern that can double as a media cabinet should be situated to the side of the screen and would contain a port to plug in the laptop and cabling for power, network access and projection.

**Action 1:** Evaluate technology component needs based on classroom use and size. Not every classroom will required all items listed. Examples are listed below for the purpose of estimation only.
Action 2: Define a standard for laptop computers and determine initial purchase requirements.

Smart Classroom Cost Estimates

<table>
<thead>
<tr>
<th>Technology Cost Estimates for Example Classroom (Capacity 30 students)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Items</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Drop Down Screen</td>
</tr>
<tr>
<td>Video Projector</td>
</tr>
<tr>
<td>Video Projector Ceiling Mounts</td>
</tr>
<tr>
<td>Speakers</td>
</tr>
<tr>
<td>Television</td>
</tr>
<tr>
<td>VCR/DVD</td>
</tr>
<tr>
<td>Lectern/Media Cabinet</td>
</tr>
<tr>
<td>Wall Control Panel</td>
</tr>
</tbody>
</table>

*** Assistive technologies (e.g., captioning for students with disabilities) are usually handled on a case-by-case basis in which the student requests the services, which are then contracted by the school.

<table>
<thead>
<tr>
<th>Technology Cost Estimates for Optional and Additional Technology Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Items</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Wireless Microphone Units</td>
</tr>
<tr>
<td>Television Receivers</td>
</tr>
<tr>
<td>Overhead Cameras</td>
</tr>
<tr>
<td>Smart Board (front projection, wall mounted)</td>
</tr>
<tr>
<td>Smart Board (mobile, rear projection, self-contained)</td>
</tr>
</tbody>
</table>
Smart Classroom Solution Examples

Speakers

Television

Projector and Document Camera

Cameras

Lectern Style Furniture

Functional and Secure
6.3.2 Two-Way Video Classrooms

There are two basic models for video classrooms: (1) the Television Studio/Classroom model and (2) the corporate Teleconferencing model. The Television Studio/Classroom model is usually identified with a presenter, an audience and a camera operator in an adjacent booth. The Corporate Teleconferencing model is associated with participant sitting around a large conference table with the technology controlled by the presenter. Both models enable the District to include students in the classroom that are in another physical location, potentially in the class next door or a classroom on another campus. The session may also be recorded for later viewing on the Internet.

Television Studio/Classrooms typically have an Instructor’s Console with monitors, remote-controlled Video Cameras and an Overhead Video Graphics Camera, Microphone and Speakers, Computer, Digitized Tablet and a large screen for students in the room to see the graphics.

The equipment is controlled by a technical operator in an adjacent control room with monitors, a video switcher, zoom, pan and tilt controls, audio controls, character generator and VCRs. Since Gavilan already has a television studio, we will not further detail this model.

A second model for video classroom is the Corporate Teleconferencing model with a small pad to control a camera above the monitor, a graphics camera for documents, and a computer for the room. The camera in the room can be pre-set with an overall room shot, several student area locations, a presenter shot, etc. Often two large screen monitors show the participants visuals from their site on one monitor and the participants or graphics from a distant site on a second monitor. Several table microphones and speakers complete the room. This type of requirement did not come up in the workshops. If this is a requirement, we can address it separately.
6.4 Labs

This section addresses 2 types of labs.

- **Instructional Labs** are used to teach the use of specialized equipment and/or applications in the room. Regular class times are scheduled in these labs. Some require the students and the instructor to interact with specialized hardware and software as in the Nursing Lab, the Multi-Media Lab, and the Network Lab. Other labs such as the Career Transfer Center utilize specialized software and allow the students to either drop in or schedule appointments for career counseling.

- **Open Labs** are generalized labs for the students that allow the use of basic software programs and research. The Library is an example of an Open Lab that is available to every student. There are also Open Labs that are available to only a cross-section of the student population. The TRIO center is an example of a location that is available to only those students who qualify to participate in the TRIO program. There are approximately 160 students in the TRIO program.

**Goal:** Create efficiencies and consistencies in the labs that would benefit the student’s and faculty’s use of the lab facilities.

**Strategy 1:** Consolidate the physical locations of the labs so that physical resources in the labs could be better managed, resources for student supervision could be reduced, and student’s experience could be made consistent.

**Strategy 2:** Leverage a Common Computing Environment as described in Section 5.3.

**Action 1:** Form a lab committee and develop a physical lab consolidation plan.

**Action 2:** Identify the physical spaces for the labs on campus.

**Action 3:** Develop the layout of the physical spaces and incorporate the Lab Standards for Instructional Labs or Open Labs (from the following sections) into the design.

**Action 4:** With the lab committee, develop the use and staffing models for each lab.
Action 5: Inventory specialized software used in the labs and determine what can be leveraged from the Common Compute Environment and what software, if any, will be managed locally or procured.
6.4.1 Instructional Labs

Goal: Create an effective learning environment and provide for greater flexibility in the current and future use of the instructional labs.

Strategy: Leverage the classroom standards and add-on technologies as the basis for instructional lab standards. Achieve flexibility by in arrangement of the labs by cabling power and network access to access points in the floor and around the perimeter using channel cable molds.

Action 1: Take the Actions stated in Section 6.2.

6.4.2 Open Labs

Goal: Provide a productive environment for the students to work independently.

Strategy: Consolidate the physical lab locations to save on resources required to manage the environments and supervise the students.

Strategy 2: Leverage the Common Compute Environment to gain access to specialized software.

Action 1: Take the Actions stated in Section 5.3, Common Computing Environment.
7. Conclusion

Throughout the process of gathering information and preparing this recommended plan, the three key non-technology issues continued to surface as “overriding themes”. Training surfaced (unprompted) at nearly every juncture and was strongly noted as an area that is severely lacking and impeding individual success. Staffing also emerged as a theme which, left unaddressed, will likewise preclude full success of any technology plan.

Likewise, technology-related access, consistency, and flexibility were recurring themes. These are dependent on a solid foundation of centralized services and infrastructure.

Nevertheless, in all cases, there was an overwhelming sense that all concerned were driven by the same overriding focus – a focus on students and the experience they receive from the District; the various components of this recommended plan were developed with this overriding theme in mind.

The next steps in this process are for district staff to review this recommendation set and provide input and feedback. This will then be followed by a final delivery of recommendations incorporating that feedback.

Lastly, it is important to reiterate that many of the recommendations within this plan are not based on new requirements. These requirements have been discussed by the staff before, but they did not receive the attention of looking at all of them together due to operation budget limitations. With the addition of bond monies they have the opportunity of addressing the strategic direction of District technologies.
8. Appendix

Initial Findings for Minimum Standards for Classrooms & Labs Technology Plan Draft – v1.0  (Dated May 19, 2005)