2018

Results of the Technology Audit

for the Fort Bend Independent School District

PREPARED AND SUBMITTED BY:

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AN EDUCATION CONSULTING & RESEARCH GROUP

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Executive Summary

In October 2017, Gibson Consulting Group, Inc. (Gibson), as part of its continuing work to provide internal auditing services for the Fort Bend Independent School District (Fort Bend ISD) Board of Trustees, began an internal audit and an operational review of the district's Information Technology Division.

The objectives of this audit were to evaluate compliance, efficiency, and effectiveness of the Fort Bend ISD Information Technology Division, and identify opportunities for improvement. Four major areas of technology were analyzed during this audit:

1. Organization, Staffing, and Spending
2. Network Infrastructure
3. Technology Support Services
4. Applications

The approach to this audit involved the analysis and triangulation of data from multiple sources, including district-provided data, school visits, and interviews and focus group sessions with campus leaders, campus technology support staff, and key district leaders. In addition, interviews were held with key Information Technology Division staff to gain an in depth understanding of the technology function in Fort Bend ISD. Appendix A contains a complete interview roster.

In addition to site visits, interviews and focus group sessions, the audit team conducted two audit tests to corroborate key technology processes, obtain evidence of documentation maintenance, and validate compliance with district policy. Table 1 provides a high-level summary of the tests that were executed for this audit.

Table 1. Audit Testing Summary

Test Number	Sample Size	Test Overview
Test 1: Non-Employee Active Directory Access	10	A sample of 10 non-employees (Consultants) with access to the Active Directory were selected and access and requesting documentation was reviewed for each.
Test 2: Data Protection Agreements	5	A sample of 5 third party software vendors was selected and the contracts were reviewed for each to ensure proper protection of district data.

Details regarding each test and the results are included in *Section 6 – Technology Audit Testing* of this report.

Audit Summary

During interviews and focus group sessions with Fort Bend ISD district leaders, principals, and division technology staff, and others, the audit team found that district staff are satisfied with the services they are receiving from the Fort Bend ISD Information Technology Division. Technology staffing and spending have increased substantially in recent years, but this was due to a deliberate investment by the district to increase the use of technology to support student learning. Technology spending is now more in line with benchmark and peer averages on a per student basis.

The division made significant progress in areas such as wired and wireless infrastructure, data center and information security. Overall, this audit found the Information Technology Division to be effective and responsive to campus and district needs. The division and its leadership are working to create a private sector-like technology support organization with the resources that they have.

The audit identified two best practices for which the district should be commended:

- The district has a security advisor position that directly reports to the Chief Information Officer. The primary responsibility of this position is to make sure Fort Bend ISD uses and practices safe and secure information technology processes and increase information security awareness among district staff. Technology and information security is one of the most critical challenges of today's organizations given the interaction of data over the cloud and the increased usage of technology.

- The Information Technology Division has a data integration group that focuses on data integration with the district's more than 40 hosted applications. This allows the district to standardize and control data integration and data exchange tasks with 3rd party vendors and hosted applications. This brings consistency, accuracy, and much required scrutiny to the integration of systems and exchange of data.

The audit team also identified 13 recommendations to improve the efficiency, effectiveness, and compliance of the Information Technology Division (see Table 2). The most significant opportunities for Fort Bend ISD are to have a fully funded student computer device refresh plan for the aging student computer devices, to assign responsibility to provide non–instructional technology training to district staff, and to have a signed data protection agreement with vendors that data are shared with.

Recommendations are not listed in order of priority; however, their priority is established in the first column.

Table 2. Summary of Recommendations

Priority	No.	Recommendation
Medium	1	Implement and track additional key performance indicators (KPIs) to measure division efficiency and locate areas of improvement.
High	2	Assign responsibility to district staff to provide non-instructional technology training.
High	3	Develop and implement a fully funded student computer device refresh plan that distributes devices equitably among Fort Bend ISD schools.
Medium	4	Develop a comprehensive disaster recovery and business continuity plan and test it periodically.
Medium	5	Develop an information technology service catalog and make it available to district staff.
Medium	6	Develop complete service level agreements for all the services that the information technology division provides to district users.
Low	7	Select one set of priority designation options and make sure the technology work order system reflects only those designations.
Medium	8	Develop a technology plan component for non-instructional districtwide applications.
Medium	9	Assign termination dates to all non-employee (Consultant) accounts.
Low	10	Create and maintain formal documentation for all non-employee (Consultant) account requests.
Medium	11	Ensure all Non-employee (Consultant) accounts are timely terminated.
High	12	Ensure all vendors who the district shares data with sign the district data protection agreement.
High	13	Ensure all district technology vendors sign new, up-to-date contracts.

Each of the above recommendations are discussed in the remainder of this report which is organized into the following major sections:

1. Organization, Staffing and Spending
2. Network Infrastructure
3. Technology Support Services
4. Applications
5. Technology Audit Testing

Gibson would like to express its appreciation to the Fort Bend ISD Information Technology Division management and staff for their responsiveness in providing the audit team the information needed to perform this important work, as well as their cooperation and willingness to assist us during our site visits.

Section 1 – Organization, Staffing and Spending

Background

The Fort Bend ISD technology function is supported by the Information Technology Division. The Information Technology Division is led by the Chief Information Officer (CIO) who reports to the Superintendent. The CIO meets with the Superintendent and the other chief officers on the executive leadership team weekly, where they discuss major district initiatives and issues. This direct communication channel is a best practice for technology alignment, and recognizes the importance of technology in virtually every major district decision.

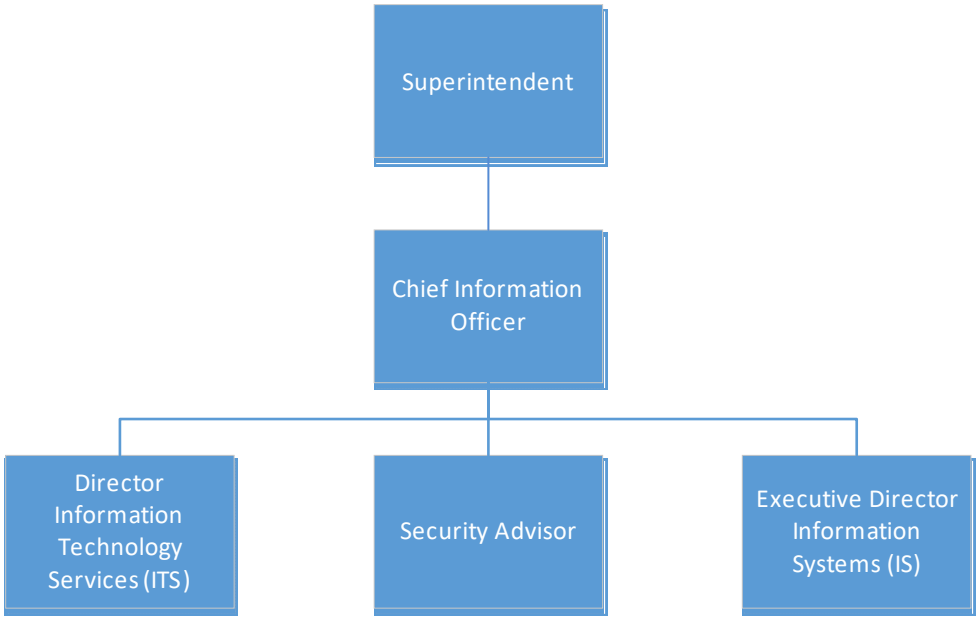
The Information Technology Division's primary functions include:

- Information Systems, which supports districtwide applications such as the Student Information System (SIS) and Enterprise Resource Planning (ERP) system, also known as the business and human resources system. In addition to application support, they maintain data integrity and integration with all applications, as well as application development.
- Information Technology Services, which supports all hardware, networks, servers, telecommunication, the data center, and technology infrastructure.

In addition to these functions, a security advisor directly reports to the CIO and is responsible for ensuring that the district's networks, data, applications, and technology infrastructure are secure and properly protected against potential attacks from inside and outside the district. The security advisor also raises awareness regarding information security with district staff.

Figures 1 shows the high-level organizational chart of the Information Technology Division.

Figure 1. Information Technology Division Organizational Chart (High-Level)

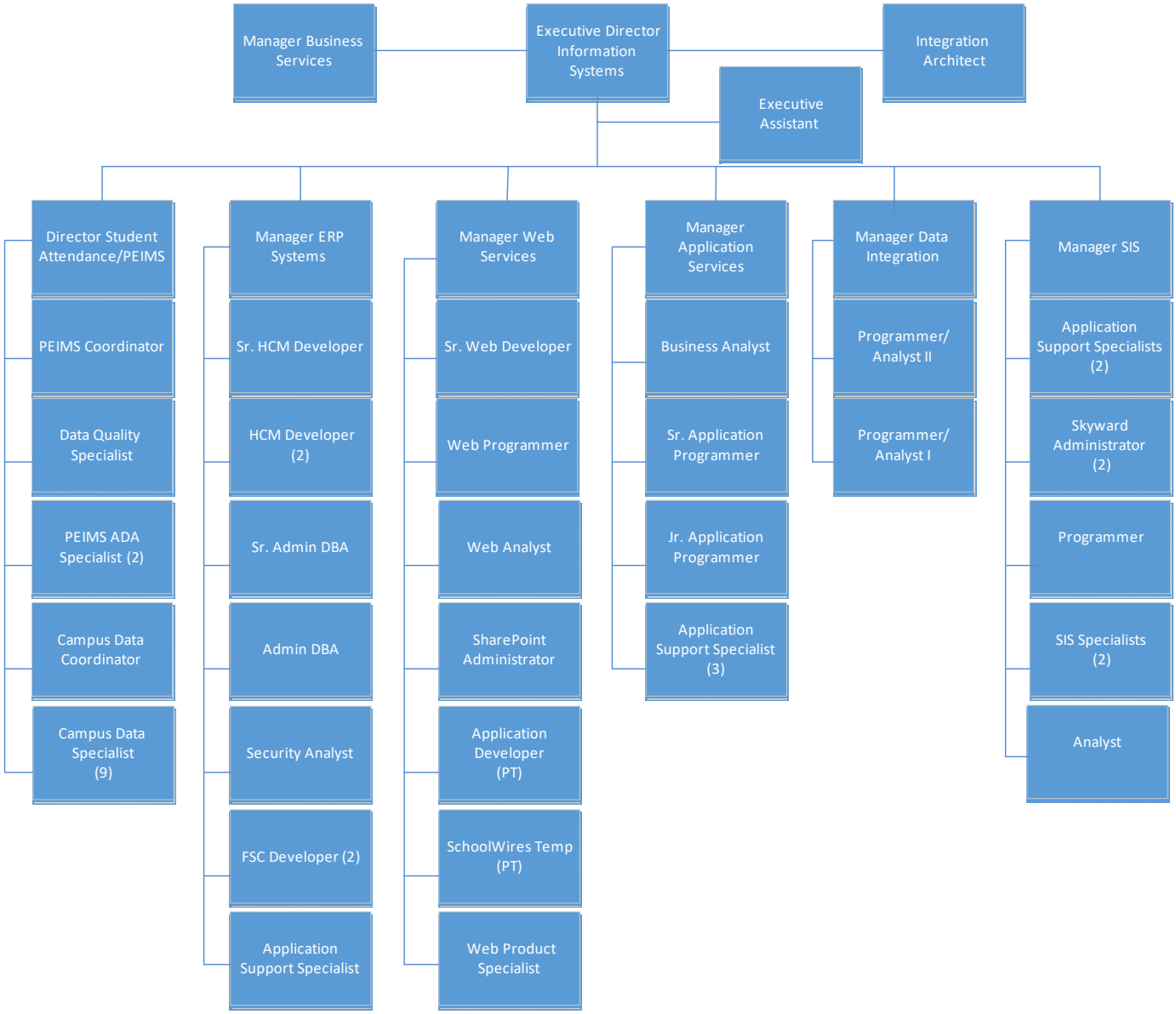


Source: Fort Bend ISD Information Technology Division organizational chart, fall 2017

Information Systems

The Information Systems function of the Information Technology Division maintains and supports all critical applications districtwide. This function is led by the Executive Director of Information Systems. A director and six managers report to the Executive Director. Figure 2 displays the Information Systems organizational chart. While five managers and a director manage six information systems groups, the integration architect and business services manager support the entire function. An Integration Architect also provides support to all district databases regardless of the application. The Business Services Manager manages all technology related vendor contracts, E-Rate, and serves as the division's liaison district to the legal department.

Figure 2. Information Systems Function Organizational Chart



Source: Fort Bend ISD Information Services function organizational chart, fall 2017

Below is an overview of each group within the Information Systems function:

1. *Student Attendance and PEIMS*: Supports all aspects of the PEIMS process including PEIMS training, data edits and accuracy, and PEIMS reporting. While this group mainly works with campuses, they also support district departments with work related to PEIMS.

2. *ERP System:* This group is responsible for maintaining and supporting the district's Enterprise Resource Planning systems which contains financial and human resources modules. In addition to the support and maintenance of the ERP system, this group creates reports and configures and customizes the system based on the requirements and needs of district users.

3. *Web Services*: This group maintains and supports the district's SharePoint portal, the district's website, all campus websites, and all web applications that are built by the district.

4. *Application Services*: Manages and supports districtwide systems that are outside the SIS and ERP system such as the library and textbook system and the benchmark testing system.

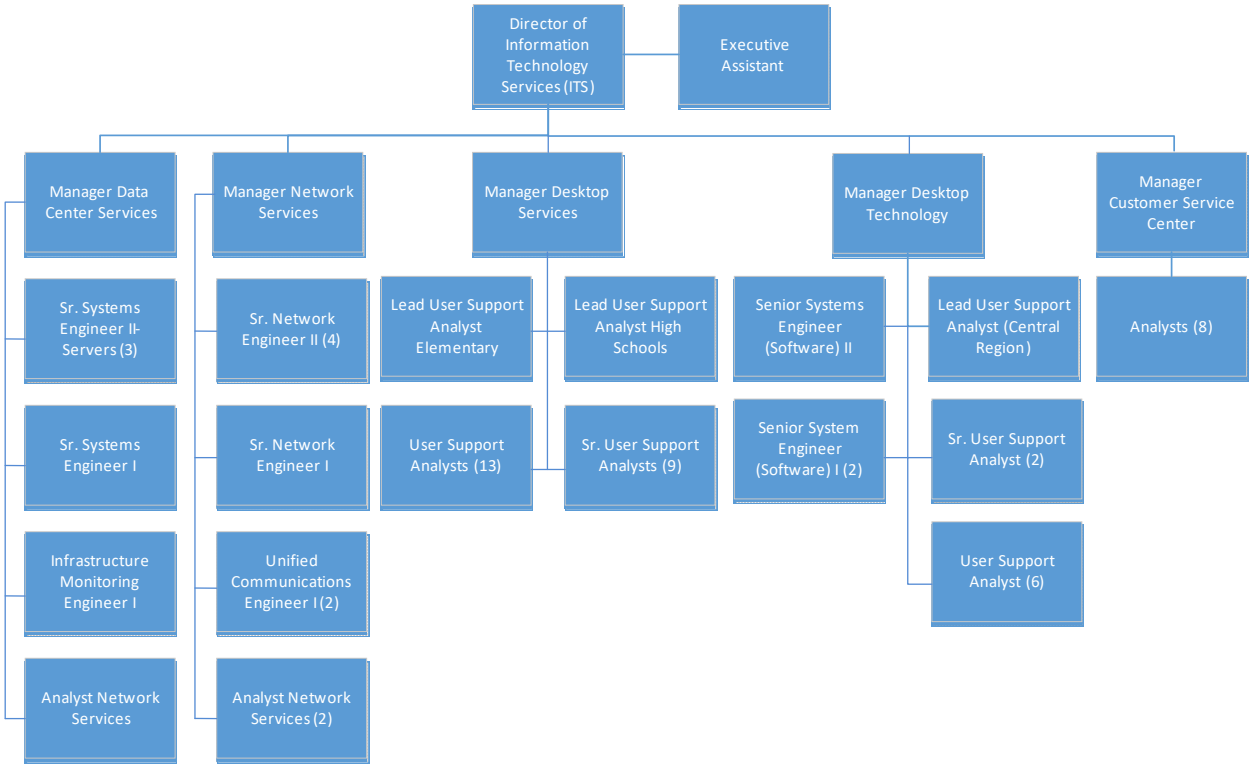
5. *Data Integration*: This group supports and manages data exchange for most district applications and is also responsible for providing data to the district's hosted vendor applications.

6. *SIS*: Supports the district's Student Information System which contains modules for attendance, scheduling, and gradebook, among others. This group mainly works with campus administrators and teachers. They also generate reports and make configurations and customizations to the SIS based on district staff requirements and needs.

Information Technology Services

The Information Technology Services function of the Information Technology Division maintains and supports all hardware including student and staff devices, telephones, projectors, smart boards, document cameras, servers, network appliances, as well as wired and wireless networks for the district. This function is led by the Director of Information Technology Services and is organized into five groups, with a manager over each group reporting to the Director (see Figure 3).

Figure 3. Information Technology Services Function Organizational Chart



Source: Fort Bend ISD Information Technology Services function organizational chart, fall 2017

Following is an overview of each group within the Information Technology Services function:

- *Data Center Services*: This group maintains and supports the district's data center, storage equipment, and servers including the management of the district network operating system - Microsoft Active Directory. Microsoft Active Directory allows district users to have secure access to district resources, as well as district email servers.

- *Network Services:* This group provides wired and wireless network support and manages district network equipment, including firewalls, routers, switches and web filtering appliances. The district's voice over IP phone systems and all voice over IP phones are also managed and supported by this group.

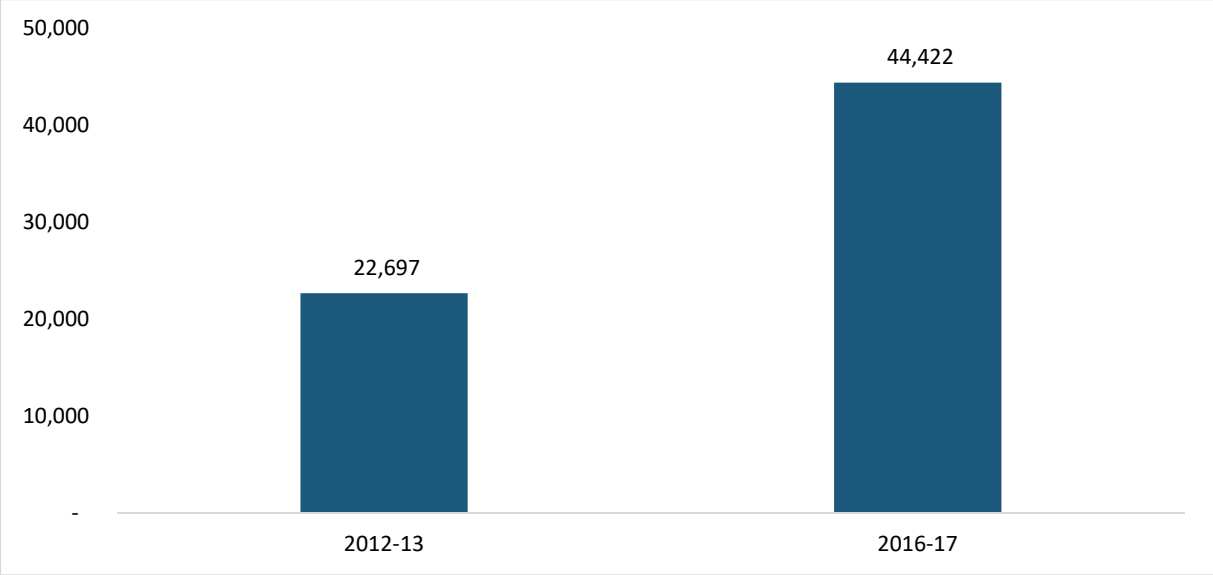
- *Desktop Services and Desktop Technology*: Both of these groups provide technical support for the computers, tablets, phones, and all other technology devices for the district staff. These two groups have divided district campuses and departments between them to provide equitable support. Both groups use a model of one support analyst per high school, one support analyst for every two middle schools, and one support analyst for every four elementary schools. The Desktop technology group also supports and maintains the districts pre-determined computer device images. If needed, the images allow technicians to reinstall all available applications to a user device all at once. The groups use a work order ticketing system to manage their workload.

- *Customer Service Center*: This group manages the district help desk. All technology related support questions come to the customer service center group via phone call, email and/or a work order ticket. They handle all support including application, hardware, and phone support. The group performs as the first line of support for all technology support requests. If customer service staff cannot resolve a support issue, then they assign it to a support analyst or engineer within the function. This group also uses the district's technology work order ticketing system to manage technical support requests.

The Information Technology Division has the necessary functions within its organization to provide high-level service to the district and its stakeholders. In addition to having the necessary functions, the division has aligned staff reporting relationships to achieve appropriate oversight and proper segregation of duties. Job descriptions of the division staff are up-to-date and reflect assigned responsibilities. The division also went through a compensation review, along with the rest of the district, in 2016-17 and several compensation adjustments were made for division staff.

The Information Technology Division has grown substantially in recent years, primarily because of the substantial increase in technology devices. Between fiscal years 2012-13 and 2017-18, the district doubled the number of technology devices, most of which were computers and tablets supporting instruction. Figure 4 shows the number of student and staff devices in 2012-13 and 2016-17.

Figure 4. Total Number of FBISD Computers and Tablets, 2012-13 and 2016-17



Sources: Fort Bend ISD Technology Inventory reports, November 2017

Since 2012-13, the division has added 53.5 FTEs, 26 of which were new positions. The remaining 27.5 FTEs were vacant budgeted positions that were filled by the division over four-year period. The largest staff increase occurred in the Information Technology Services function. This function added support analysts, engineers, and manager positions to accommodate the growth in devices and provide a better technical support model (one support analyst per high school, one support analyst for every two middle schools,

and one support analyst for every four elementary schools). In addition, analysts that were supporting the "customer service desk" moved from the Information Systems function to the Information Technology Services function. The information systems function also added campus PEIMS specialists to assist high school staff with PEIMS data accuracy and integrity.

The Information Systems function also added 15 FTEs since 2012-13. The largest increase in this function is related to eight campus PEIMS specialist positions who assist high school staff with PEIMS data accuracy and integrity issues. To support the increased number of software vendors working with the district, the function also added several developers and managers to strengthen the data integration and data sharing process. Table 3 includes an overview of the district's Information Technology Division staffing since the 2012-13 school year.

Table 3. Staffing FTE for all Positions in the Information Technology division, 2012-13 to 2016-17

Technology Functions Position Categories	2012-13	2013-14	2014-15	2015-16	2016-17	Δ Change from 2012-13
272 Chief Information Officer	**2.0**	**2.0**	**3.0**	**2.0**	**3.0**	**1.0**
Chief	1.0	1.0	1.0	1.0	1.0	0.0
Advisor	0.0	0.0	1.0	0.0	1.0	1.0
Clerk	1.0	1.0	1.0	1.0	1.0	0.0
253 & 293 Information Systems	**39.0**	**41.0**	**44.0**	**59.0**	**54.5**	**15.5**
Director	2.0	2.0	2.0	3.0	2.0	0.0
Manager	1.0	0.0	8.0	9.0	8.0	7.0
Project Manager	0.0	0.0	1.0	3.0	0.0	0.0
Analyst	10.0	8.0	7.0	9.0	8.0	(2.0)
Campus Specialist PEIMS	0.0	0.0	0.0	4.0	8.0	8.0
Clerk	1.0	1.0	1.0	1.0	1.0	0.0
Coordinator	2.0	2.0	1.0	1.0	1.0	(1.0)
Developer	7.0	10.0	11.0	16.0	15.5	8.5
Engineer	1.0	1.0	1.0	1.0	1.0	0.0
Specialist	15.0	15.0	11.0	12.0	10.0	(5.0)
Temp	0.0	1.0	1.0	0.0	0.0	0.0
274 Information Technology Services	**29.0**	**42.0**	**44.0**	**52.0**	**66.0**	**37.0**
Director	1.0	1.0	1.0	1.0	1.0	0.0
Clerk	1.0	1.0	1.0	1.0	1.0	0.0
Manager	2.0	3.0	2.0	2.0	5.0	3.0
Analyst	16.0	26.0	28.0	36.0	44.0	28.0
Engineer	8.0	9.0	10.0	11.0	13.0	5.0
Project Manager	0.0	0.0	1.0	0.0	0.0	0.0
Specialist	1.0	1.0	1.0	1.0	1.0	0.0
Summer Helper	0.0	1.0	0.0	0.0	1.0	1.0
Total	**70.0**	**85.0**	**91.0**	**113.0**	**123.5**	**53.5**

Source: Fort Bend ISD Information Technology division staff and position data from 2012-13 to 2016-17

Technology operating expenditures increased $6.4 million from 2012-13 to 2016-17, more than half of which was caused by staffing increases. The largest percentage increases occurred from 2012-13 to 2013-14 (30%) and from 2013-14 to 2014-15 (25%). Approximately $3.3 million of the $6.4 million increase was due to staff additions and salary changes. The remaining $3.1 million was used for refreshing staff computers, purchasing new software such as Microsoft Office 365 and the learning management system, and infrastructure costs that included changes in internet and fiber provider fees. The district signed a new agreement for fiber and internet services in 2017-18 which will reduce associated fees. However, the district may see continued expenditures on hardware, if they refresh student devices. Table 4 presents a five-year history of technology spending by expenditure type.

Table 4. General Fund Expenditures by Expenditure Type, 2012-13 to 2016-17

Technology Expenditures by Object	2012-13	2013-14	2014-15	2015-16	2016-17	Δ Change from 2012-13
6100 Payroll Cost	$5,369,795	$6,399,432	$7,551,814	$8,299,409	$8,763,189	63%
6200 Professional & Contracted Services	$3,780,284	$5,451,686	$5,275,633	$5,105,482	$5,917,624	57%
6300 Supplies & Materials	$342,354	$537,852	$2,505,516	$1,411,493	$1,244,241	263%
6400 Other Operating Costs	$51,930	$45,778	$52,100	$70,156	$41,800	(20%)
6600 Capital Outlay - Land, Buildings & Equipment	$59,326	$55,235	$265,143	$13,548	$125,370	111%
Total	**$9,603,689**	**$12,489,983**	**$15,650,206**	**$14,900,088**	**$16,092,224**	**68%**
Percent change from prior year	-	30%	25%	(5%)	8%	

Source: Fort Bend ISD Information Technology Division technology expenditures data from 2012-13 to 2016-17

Table 5 presents technology expenditures per pupil over the past five years, indicating that a portion of the growth in technology spending was due to enrollment growth.

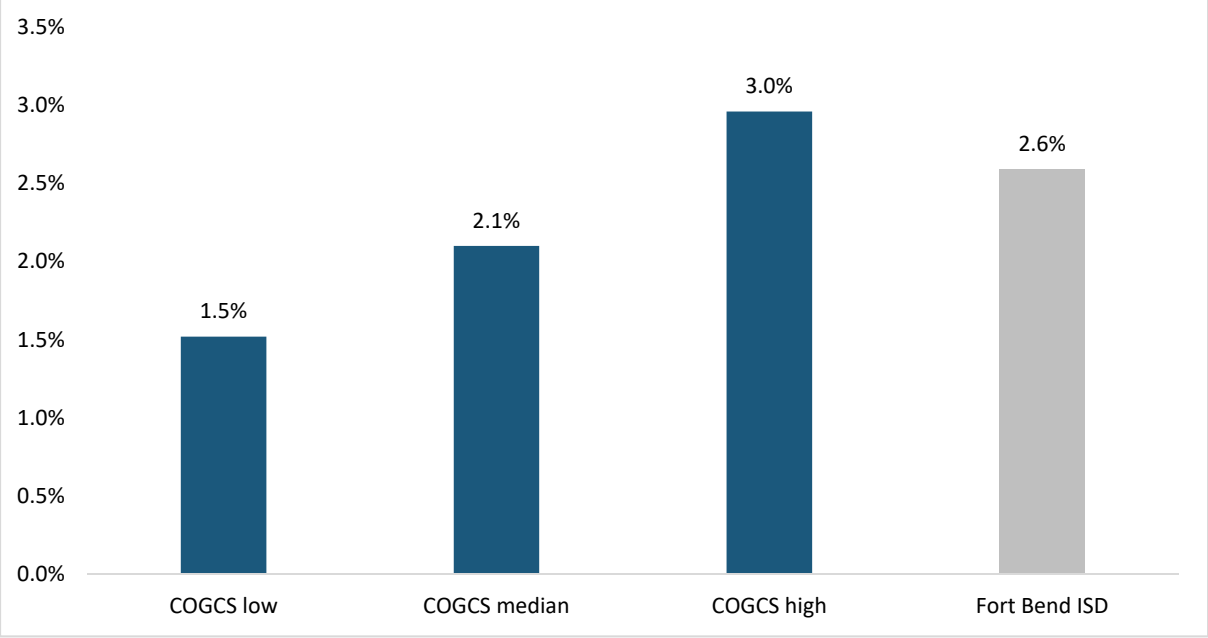
Table 5. General Fund Technology Expenditures per Pupil, 2012-13 to 2016-17

	2012-13	2013-14	2014-15	2015-16	2016-17	$ Δ from 2012-13
Technology Expenditures	$9,603,689	$12,489,983	$15,650,206	$14,900,088	$16,092,224	68%
Student Enrollment	69,123	70,512	71,681	72,910	73,750	7%
Technology Expenditures per Pupil	$138.94	$177.13	$218.33	$204.36	$218.20	57%
Percent change from prior year	-	27%	23%	(6%)	7%	-

Source: Fort Bend ISD Information Technology Division technology expenditures data from 2012-13 to 2016-17

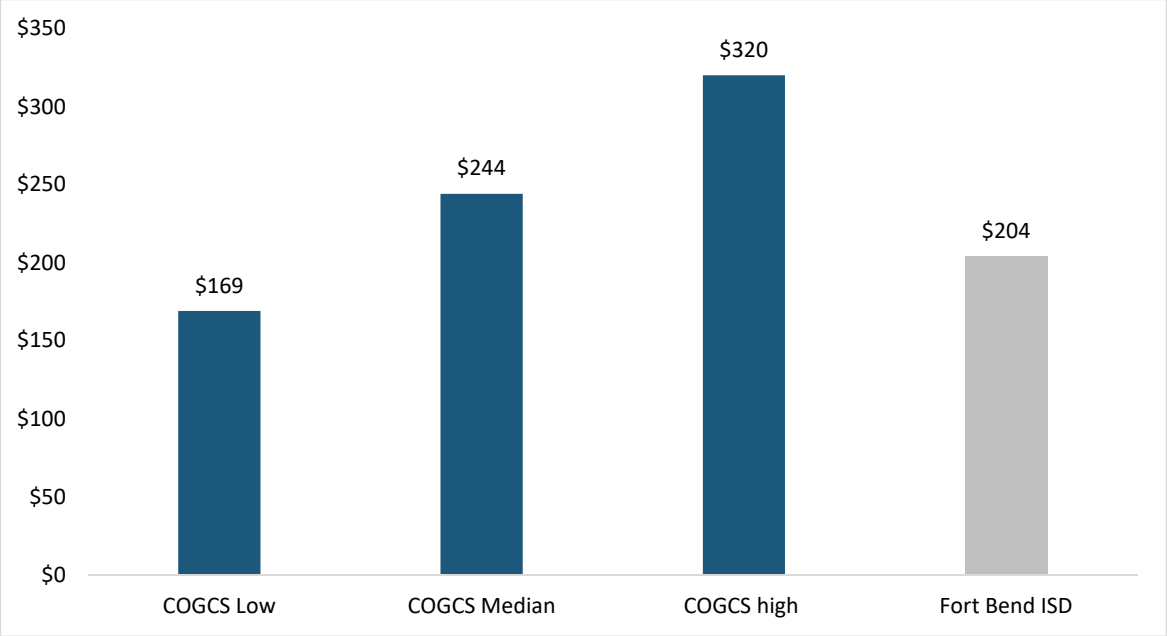
A useful benchmark available for technology spending is the Council of Great City Schools (COGCS), a national organization representing the needs of large urban school districts. The member school systems have student enrollments ranging from 35,000 to 700,000 students. A 2017 COGCS report included key performance measures and the results from 61 member school systems in various areas, including information technology. There are two performance measures related to technology spending in this report: technology operating expenditures as a percentage of total district operating expenditures and technology spending per student. Figures 5 and 6 show Fort Bend ISD's measures against the COGCS' lower, median, and upper quartile measures for 2015-16, the most recent COGCS data available. Fort Bend ISD is above the median but below the upper quartile on the percentage measure yet below the median on the spending per student measure.

Figure 5. Percentage of Technology Expenditures to Total Operating Expenditures, COGCS and Fort Bend ISD, 2015-16



Sources: Fort Bend ISD Expenditure Extract, 2015-16; COGCS Benchmark Report, November 2017

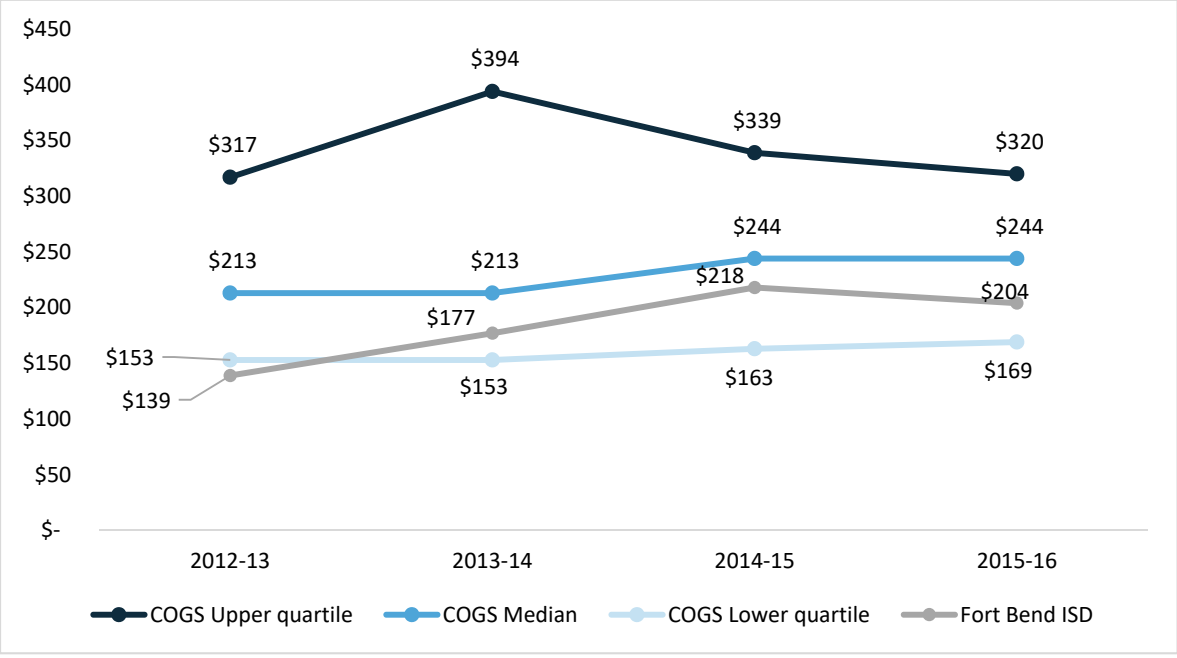
Figure 6. Technology Expenditures per Student, COGCS and Fort Bend ISD, 2015-16



Sources: Fort Bend ISD Expenditure Extract, 2015-16; COGCS Benchmark Report, November 2017

Figure 7 shows technology-related expenditures per student for COGCS and Fort Bend ISD in the last four years. The trend data shows that Fort Bend ISD was below the lower quartile of the COGCS districts in 2012-13. Although Fort Bend ISD is closing the gap on technology expenditures per student against COGS districts, they are still below the median.

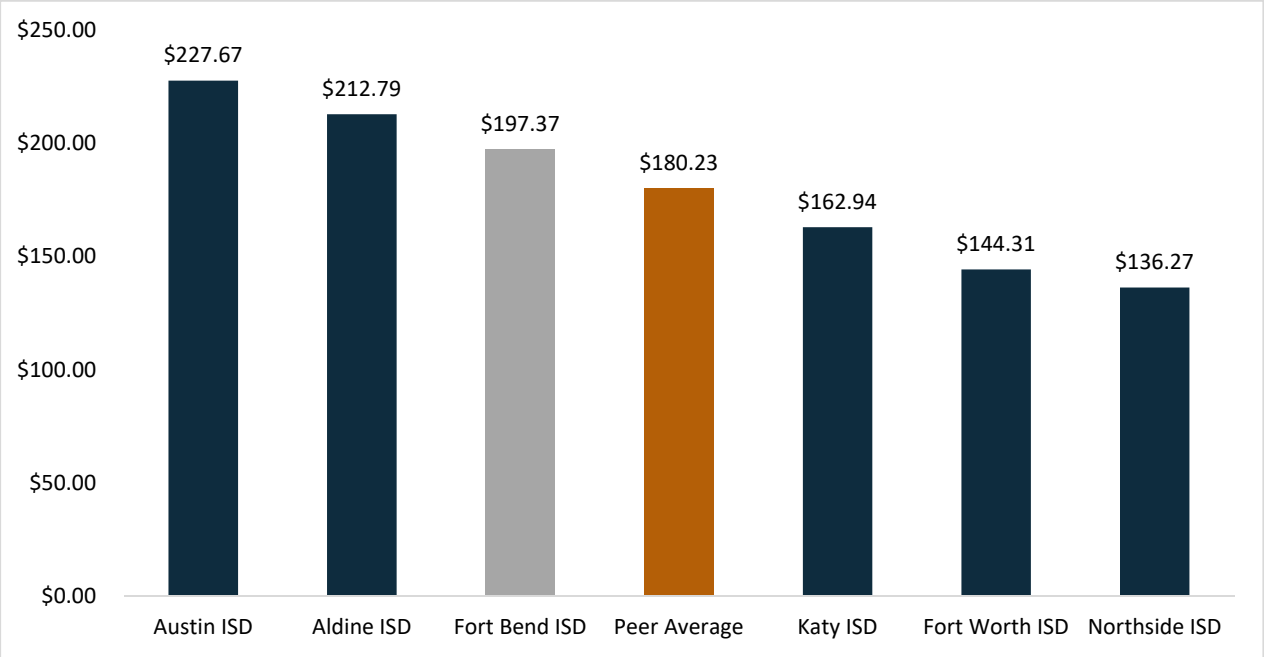
Figure 7. Technology Expenditures per Student, COGCS and Fort Bend ISD, 2012-13 to 2015-16



Sources: Fort Bend ISD Expenditure Extract, 2015-16; COGCS Benchmark Report, November 2017

Figure 8 shows 2015-16 (the latest available year from the Texas Education Agency at the time of this report) general fund technology expenditures per pupil for Fort Bend ISD and similarly sized peer districts in Texas and in the region.[1] In this comparison, Fort Bend ISD is slightly above the peer average.

Figure 8. 2015-16 Function 53 Data Procession General Fund Expenditures per Pupil



Source: Texas Education Agency Standard financial reports, 2015-16

The district has made significant investments in computer devices, technology infrastructure, and software in recent years. Although technology expenditures have increased 68 percent over the past four years, this served mostly to bring the district's technology in line with similar districts. While these technology investments have brought the district closer to achieving the technology-related goals outlined in the district strategic plan, Fort Bend ISD's primary challenge will be to find ways to replace aging technology and bring new technologies to the district as need arises.

[1] Expenditures reflect technology "function" expenditures (TEA function code 53)

Audit Findings and Recommendations

Finding 1: The district does not track all key performance indicators (KPIs) necessary to division performance.

Currently the district is tracking three key division indicators (KPIs):

- Major Application Percentage Uptime
- Percentage of technology support cases created, resolved, and remaining open per month over the past 5 years.
- Percentage of technology support calls presented, handled, and abandoned per month over the past 5 years.

Although this information is important to track, there are no targets for any of the above measures. There are also other key measures the district should implement in order to more thoroughly division performance and overall use of its resources.

Recommendation 1: Implement and track additional key performance indicators (KPIs) to measure division efficiency and locate areas of improvement.

The district should choose additional KPIs to begin implementing in order to measure efficiency and highlight areas of improvement within the division. Some common performance indicators tracked within district technology division include:

- Average Age of Computers
- Devices per employee
- Devices per student
- Break/Fix Staffing Cost per ticket
- Help Desk Staffing Cost per ticket
- WAN- Availability
- IT Spending per student
- IT Spending Percent of District budget

KPIs should allow management to gauge the effectiveness of various functions and help achieve organizational goals. KPIs can measure how efficient the division is with its investments in technology, the ability to deliver on goals to its stakeholders, and the responsiveness of the division, and many others. It is important that the performance indicators chosen align with division goals and are continually monitored. The district should also ensure that the KPIs already being tracked align with division goals and target rates should be established.

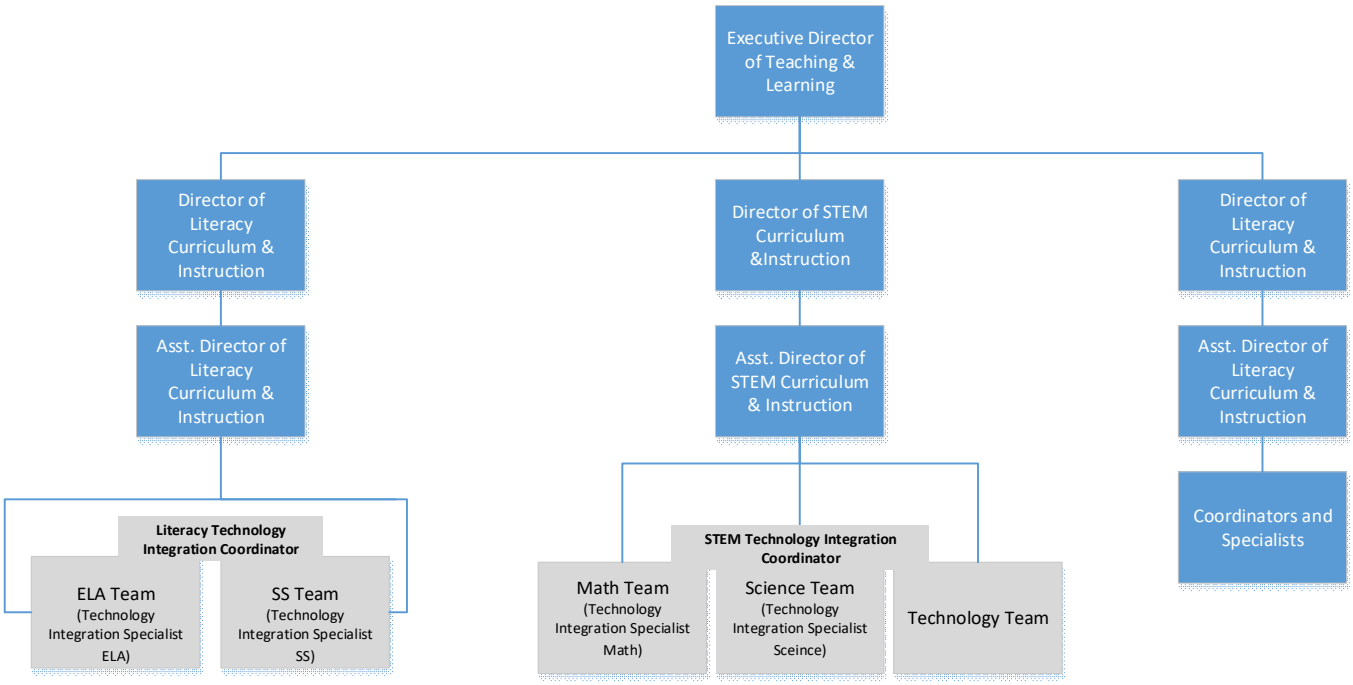
Management Response 1: *The administration agrees with this finding and supports this recommendation. By the end of December 2018, the Information Technology Division will research and implement key KPIs and a set of achievable division goals or target rates that will best enable the division to fully support the*

district's goals and vision. The Information Technology Division will begin to track the identified during the 2019-20 school year.

Finding 2: There are no district personnel assigned to conduct non-instructional technology training.

Prior to the 2017-18 school year, the Digital Learning Department was providing most of the instructional and non-instructional technology training in the district. At the end of the 2016-17 school year, Fort Bend ISD eliminated the Digital Learning Department and incorporated its instructional technology function under the Teaching and Learning Division. Figure 9 displays the instructional technology function under the new Teaching and Learning Division's organizational chart.

Figure 9. Teaching and Learning Division, Technology Overview



Source: Fort Bend ISD Teaching & Learning Division Organization Chart, fall 2017

There is a Literacy Technology Integration Coordinator for the English Language Arts Team and Social Studies Teams. There is also a STEM (Science, Technology, Engineering, and Math) Technology Coordinator for the Math, Science, and Technology Teams. The district also created a stipend position called the Technology Integration Champion at each campus, which is usually filled with a teacher. The primary responsibilities of the Technology Integration Champions are to create, implement, and monitor campus professional learning plans for instructional staff.

With the positions in the Teaching and Learning Division and the campus-based Technology Integration Champions, the district has covered the majority of the responsibilities of the previous Digital Learning Department. One area that is no longer covered is non-instructional technology training. Before the reorganization, the Digital Learning Specialist was responsible for this training. This training covered programs such as Office 365, Naviance, Gradebook, the district's security ID software Raptor, teacher

websites, and many others. Fort Bend ISD has more than 10,000 staff, including over 5,000 teachers. Training this many employees requires a dedicated staff effort.

Recommendation 2: Assign responsibility to district staff to provide non-instructional technology training.

Fort Bend ISD should thoroughly analyze options within the district for staff members to provide non-instructional technology training. Without this necessary training, Fort Bend ISD could risk not successfully implementing non-instructional technology initiatives such as the SIS upgrade. Currently, the campus-based Technology Integration Champions are mainly teachers, most of whom would not have time to complete all necessary non-instructional training. The district should research the capabilities of Teacher Development, Human Resources, and Information Technology to see if any divisions or positions have the capacity to conduct non-instructional training. If not, the district should consider hiring additional staff to fill these needs.

Management Response 2: *The administration agrees with this finding and supports this recommendation. The district recognizes that training is necessary for not only programs and applications, but also various functionalities of classroom technology including docking stations, student devices, etc. By the start of the 2018-19 school year, the Information Technology Division will collaborate with the Academic Affairs Division and Human Resources to address the needs for classroom technology training for teachers and campus personnel. The Information Technology Division will work with the Teacher Development Department, Talent Development Department and Campus Technology Integration Champions to develop and formalize solutions based on the availability of budget and personnel resources.*

Section 2 – Network Infrastructure and Hardware

Background

Network infrastructure and hardware are critical components of the larger technology landscape. These components consist of both wired and wireless networks that connect the entire organization to itself and to the rest of the world via intranet and internet, data centers that house mission critical servers, network equipment, and storage and technology devices that connect to the technology infrastructure. As technology continues to advance, more and more devices, including security cameras, bells, and classroom clocks, will be connected through the district's networks.

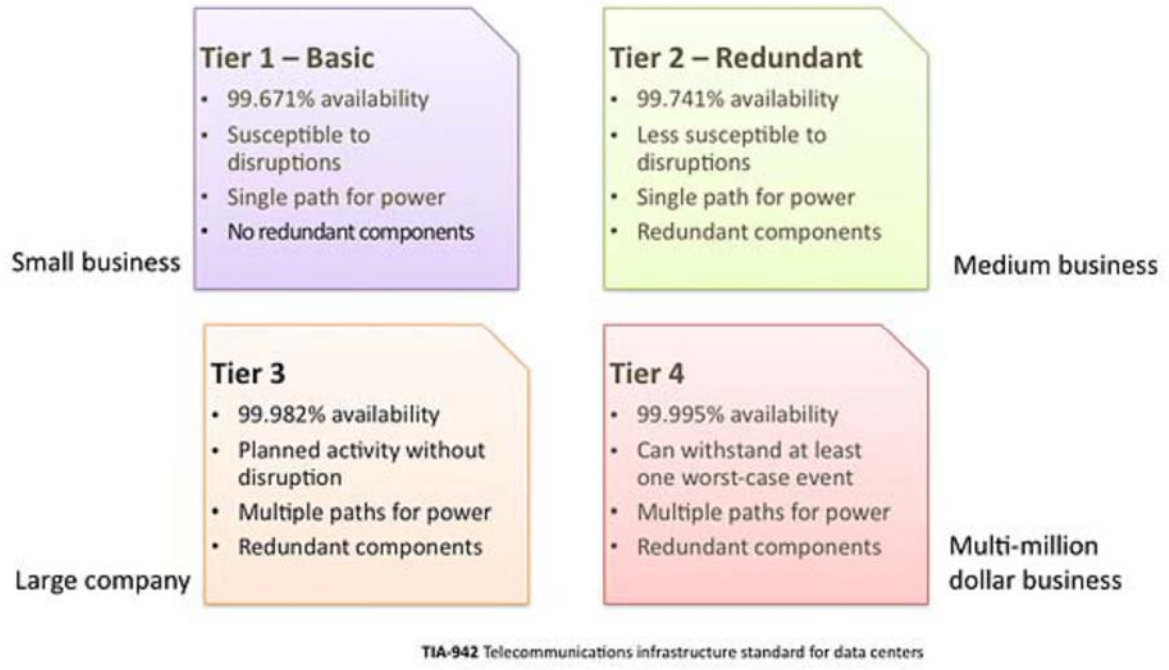
In 2014, Fort Bend ISD hired two separate companies, Education Partners Solution (EPS) and GoIT, to perform technology infrastructure and classroom technology assessments. Based on the results of these assessments combined with the district's own assessment, Fort Bend ISD developed a technology infrastructure master plan. Since then, the district has made significant investments in its technology infrastructure. These investments were mission critical and necessary to ensure the district's technology infrastructure was stable, high functioning, and secure.

Data Center

Fort Bend ISD has a single data center located in the Administration Building. The data center is comprised of the physical facilities, electrical power, uninterrupted power supplies (UPS), a generator, air conditioning, and security to support the district's comprehensive information and telecommunication systems. The data center serves as the core of the district's data as well as home to the voice network, servers, data storage, and applications.

Figure 10 shows the Telecommunications Industry Association's (TIA) Telecommunications infrastructure standard for data centers. According to the EPS assessment, the district had a Tier I data center which meant no redundancies for power, climate control, or other critical components. The assessment recommended that the district improve the data center's infrastructure to at least a Tier II level which would increase the reliability and availability of the data center as well as bring redundancy to critical components. As Figure 10 indicates, Tier I data centers do not have redundant components but Tier II and above do.

Figure 10. TIA Telecommunications Infrastructure Standard for Data Centers



Source: TIA-942 Telecommunications Infrastructure Standard Data center, www.tia-942.org

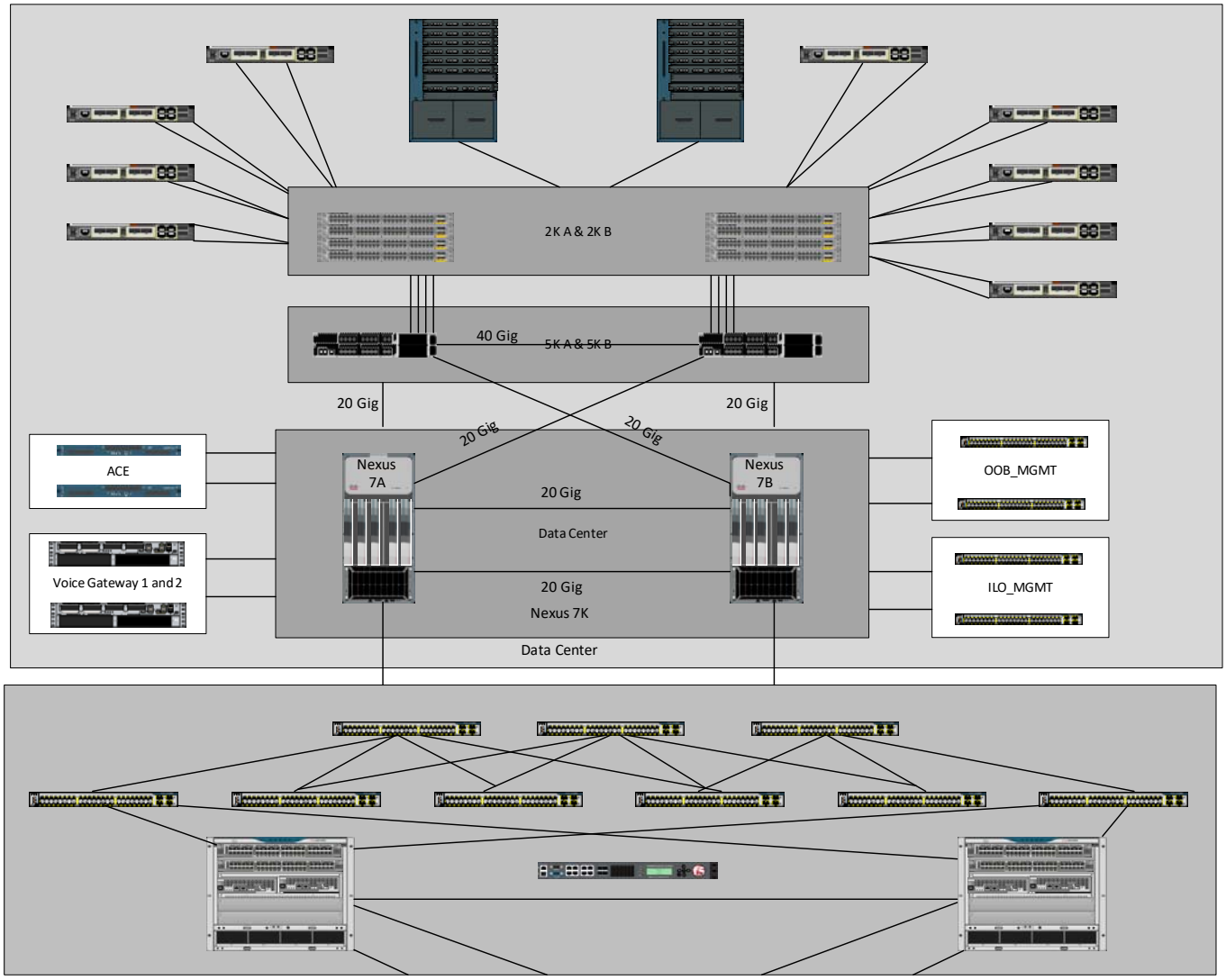
The district redesigned and updated their data center to a Tier II Data Center in 2016. Not only does it have redundancies for critical components such as power supply, climate control, and internet but also replaced physical servers with virtual servers resulting in more room in the new data center for future growth.

Data Network

The data network consists of the wide-area network, the local-area network, and the wireless network. These networks provide the mechanisms for data and voice traffic to travel from one campus to another campus, to the data center, and/or to the internet.

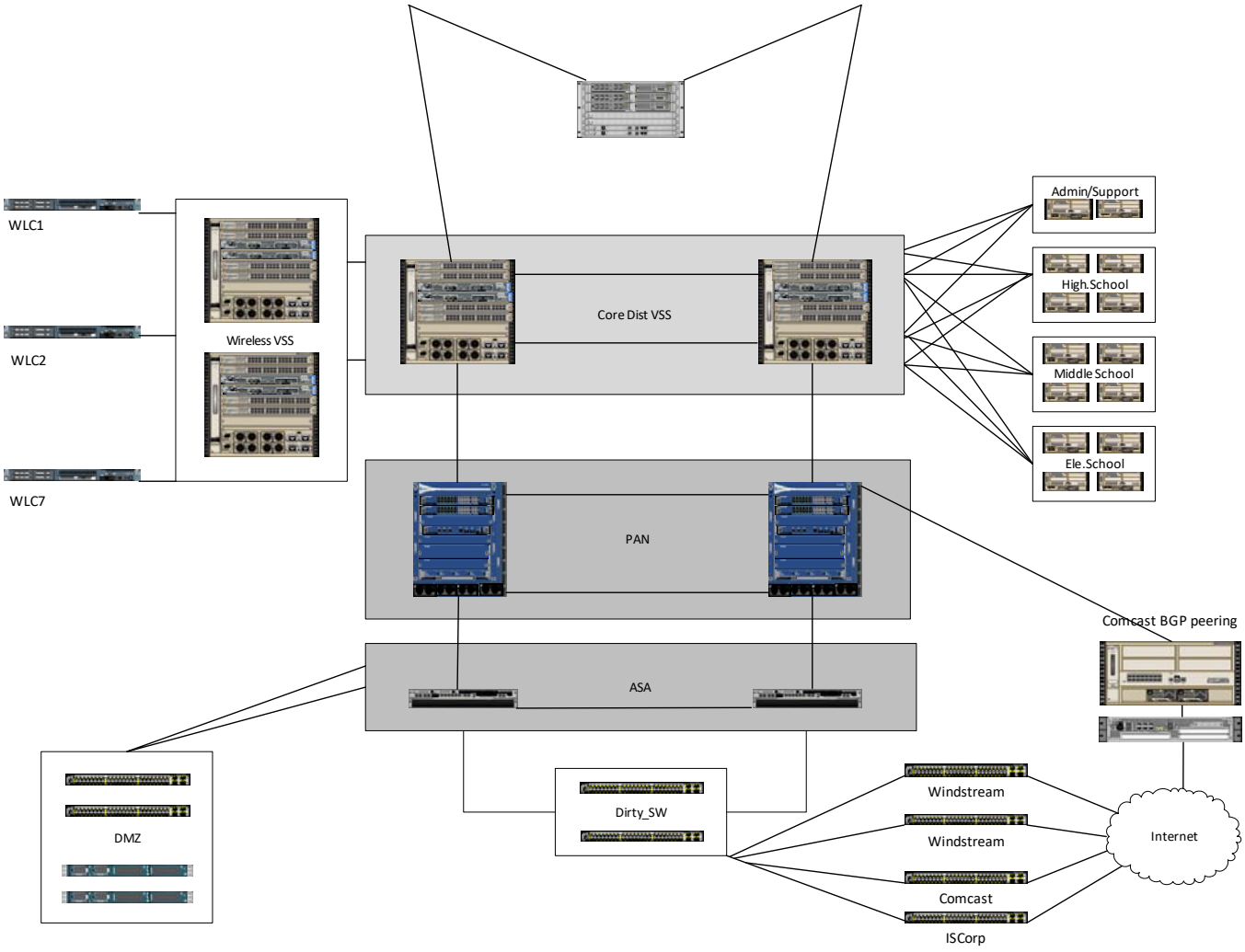
Figures 11 and 12 show a high-level wide area network diagram and internet connections including a data center. These diagrams show the redundancies in each network layer of the Fort Bend ISD wide area network infrastructure.

Figure 11. High Level Network Diagram: 1



Source: Fort Bend ISD Information Technology division network diagram, fall 2017

Figure 12. High Level Network Diagram: 2



Source: Fort Bend ISD Information Technology division network diagram, fall 2017

Wide Area Network

Fort Bend ISD's wide area network (WAN) provides data and voice connectivity between the district's worksites and the data center. The WAN consists of a one gigabit per second (Gbps) fiber optics network connecting each campus to the data center. The district is working on a project to increase the WAN links to a higher bandwidth (up to 10 Gbps) and add redundancy links so that if the link drops, campuses will not lose their network connection. The district estimates the WAN project will be completed by the end of the 2017-18 school year.

Wireless Local Area Network

Fort Bend ISD's wireless local area network (WLAN) provides wireless connectivity to mobile devices. The EPS infrastructure assessment report indicated that while the wireless network at the central office was effectively designed with current equipment, the campus wireless network was not standardized and did not have current wireless technology or infrastructure. Based on the assessment reports and the districts own observations, Fort Bend ISD initiated a wireless project to provide a reliable, secure, and fast wireless

network to its campuses. At the time of this audit, the district had completed Phase 1 of the WLAN upgrade project which included upgrades at all high schools, all middle schools, and at 20 of the district's 50 elementary schools. In Phase 2, the district plans to complete upgrades at 15 elementary schools and at 10 elementary schools in Phase 3.

Local Area Network

Fort Bend ISD's local area network (LAN) provides wired data and voice network connectivity to the classroom. The EPS network infrastructure assessment found that the majority of campus network equipment was old or close to the end of its warranty. Equipment closets that house the network equipment and cabling did not have backup power or air conditioning. If local electrical power to the equipment closet is lost without backup power, the data and voice network equipment would go down, resulting in in service being unavailable to classrooms or campus offices. Since 2014, the district has replaced older network equipment and retrofitted the campus network equipment closets so they provide the necessary physical environment.

Hardware

Technology hardware refers to physical equipment and/or devices including servers, laptops, and tablets. These devices and others make up the district's hardware infrastructure. Hardware varies greatly in size and functionality but are tools that allow access to applications and information. The technology behind hardware changes rapidly and as a result newer, faster, more capable hardware becomes available in shorter time frames, therefore increasing the rate at which hardware becomes obsolete.

Servers

Fort Bend ISD's physical and virtual server environment runs critical applications such as the district's email system, SharePoint, the district's Enterprise Resource Planning system , database environments, the time and attendance system, and various web services. According to the 2014 EPS assessment, the district had 90 physical servers, 34 of which were running on the Windows 2003 operating system, which was no longer supported by Microsoft at the time of the assessment and is not supported now. At the time of this audit, the district had reduced its physical servers to 18 and only two were still running on the Windows 2003 operating system. According to the district, both servers are scheduled to be upgraded in the 2017-18 school year and are running non-critical applications. Currently, the district is running 288 virtual servers on the 18 physical servers. In addition to moving physical servers to virtual servers, Fort Bend has moved critical systems such as email, Microsoft Office, and its internal portal, SharePoint, to a cloud environment whereby the district can have greater availability and scalability.

Computer Devices

The district provides every staff member with a computer device and has replaced most of the aging staff computers with new ones. This was a major computer upgrade project that began in 2015, pursuant to recommendations made in the 2014 GoIT study. The upgrade cost was $7.1 million, and involved 5,561 computer devices. Since 2014, the district has also upgraded 135 out of 272 school computer labs, and provided tablets to three schools. Despite these upgrades, the district's student computers remain aged.

Audit Findings and Recommendations

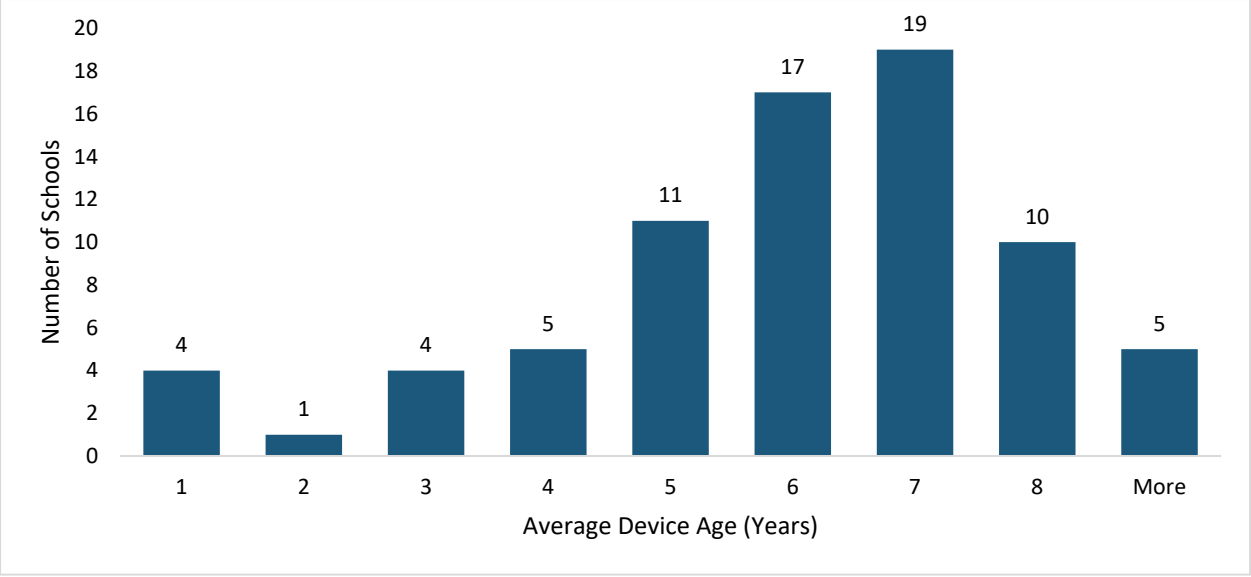
Finding 3: Fort Bend ISD does not have a fully funded refresh plan that provides a sufficient number of mobile student computer devices to be distributed equitably among the district's schools.

Fort Bend ISD's current strategic plan Goal 3 reads: "Fort bend ISD will provide an inclusive collaborative and fluid learning environment with opportunities for both risk-taking and success." The corresponding objective in order to achieve this goal states that, "FBISD will use innovative teaching strategies with the integration of technology to provide opportunities for blended and project-based learning experiences." In addition, part of the district's strategic plan profile states that students that graduate from the district will be "proficient with technology".

In order to achieve the strategic plan goals, Fort Bend ISD has been updating and upgrading its technology infrastructure over the past three years mainly within its wireless network and data center. These investments were necessary to have a stable and scalable infrastructure so that students and staff can access and take full advantage of the district's technology. The district also recently updated and upgraded staff computers and devices but has been unable to address aging student computers and devices mostly due to funding constraints.

The majority of the district's student devices – mostly desktop computers – are more than five years old and the oldest one is 12 years old. Figure 13 shows the distribution of the average age of devices located in the district's schools. The median age of student computer devices is six years, which is well past the typical replacement cycle timeline of 3 to 5 years. Eighty-two percent of district schools have devices that are five years old or older.

Figure 13. Average Student Device Age among Fort Bend ISD Schools



Source: Fort Bend ISD Information Technology Division Computer Inventory worksheet

Older computer devices tend to be slow and are not able to run many critical instructional and productivity

applications. Older devices also require more support which increases the workload of the district's technology support teams.

In addition to being outdated, there are not enough student computer devices in the district. In 2014, GoIT conducted a study which accounted for all educational devices in the district to guide the development of a technology refresh plan. Table 6 shows the total desktop computer, laptop, and tablet devices from the study, as well as fall 2017 numbers from the district's inventory system.

Table 6. Education Device Counts*, 2014 and 2017

	Desktop and Laptops	Tablets	Total
2014 GoIT Education Device Study	34,480	9,606	44,086
2017 Fall Fort Bend ISD Device Worksheet	30,340	14,082	44,422
Difference	**(4,140)**	**4,476**	**336**

Source: Fort Bend ISD Computer device inventory worksheet fall 2017 and 2014 education device assessment report
Note: * Educational device counts include student and campus staff devices

Although the overall number of devices went up by 336 devices (0.8%), the district has added more than 3,000 students and 800 staff members since 2013-14 (see Table 7).

Table 7. Fort Bend ISD Number of Students and Staff change from 2013-14 to 2016-17

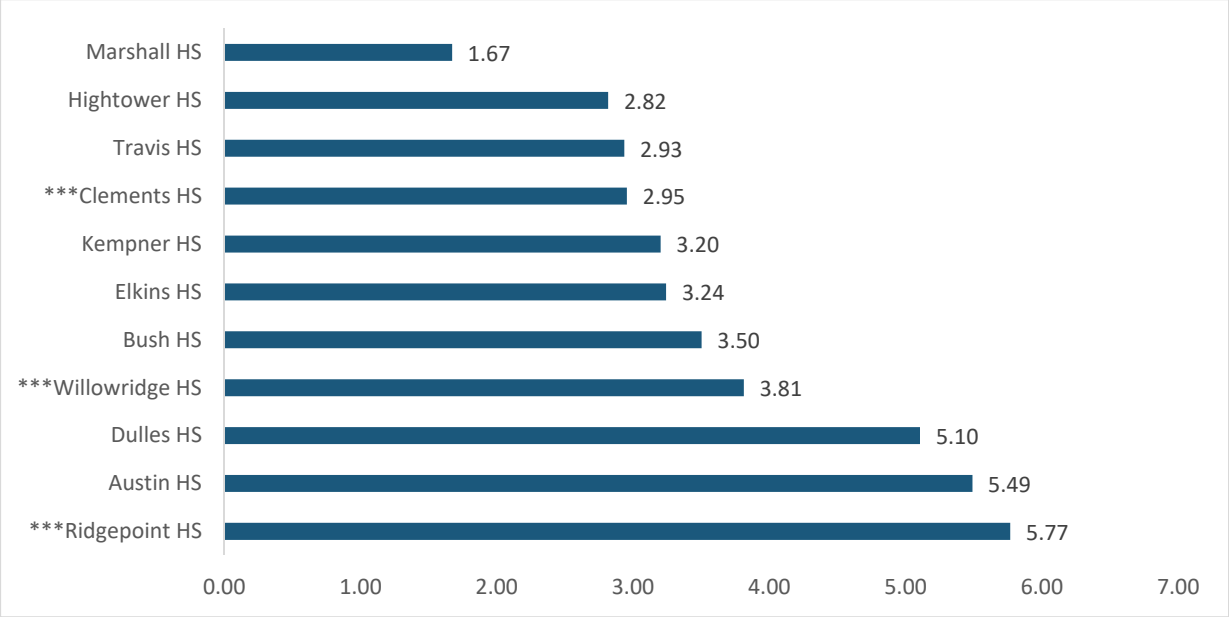
	2013-14	2016-17	Difference	% Δ
Total Staff FTE	9,451.6	10,843	1391.4	14.7%
Total Students	70,512	73,750	3,238	4.6%

Source: TEA TAPR Report

In an advisory capacity, the Texas Education Agency's 2006-2020 Long-Range Technology plan established a goal for Texas school districts to achieve a student to computer ratio of 1:1 by 2010. The district does not have a student to computer device target ratio, but is running three separate blended learning pilot programs at 16 campuses during the 2017-18 school year. Blended learning is an education program model that combines online digital media with traditional classroom teaching methods. These pilot programs include the implementation of the district's learning management system accompanied by varying ratios of students to devices. Three campuses are implementing the pilot using 1 to 1 student to computer device ratio. The other 13 campuses received 10 iPads or 10 laptops per classroom depending on the grade levels served. Regardless of which pilot program is ultimately chosen for implementation districtwide, the district is striving for either a 1 to 1 or 2 to 1 student to computer device ratio.

As of November 2017, the district had 30,574 student computer devices and 75,276 students resulting in a 2.5 to 1 student to computer device ratio. Approximately 7,000 computer devices need to be added to bring the ratio to the desired level (2 to 1). When looking at the student to computer device ratio by campus, the need for computer devices varies greatly from campus to campus. Figures 14, 15, and 16 show the student to computer device ratio in high schools, middle schools, and elementary schools respectively.

Figure 14. Student to Computer Device Ratio, High Schools



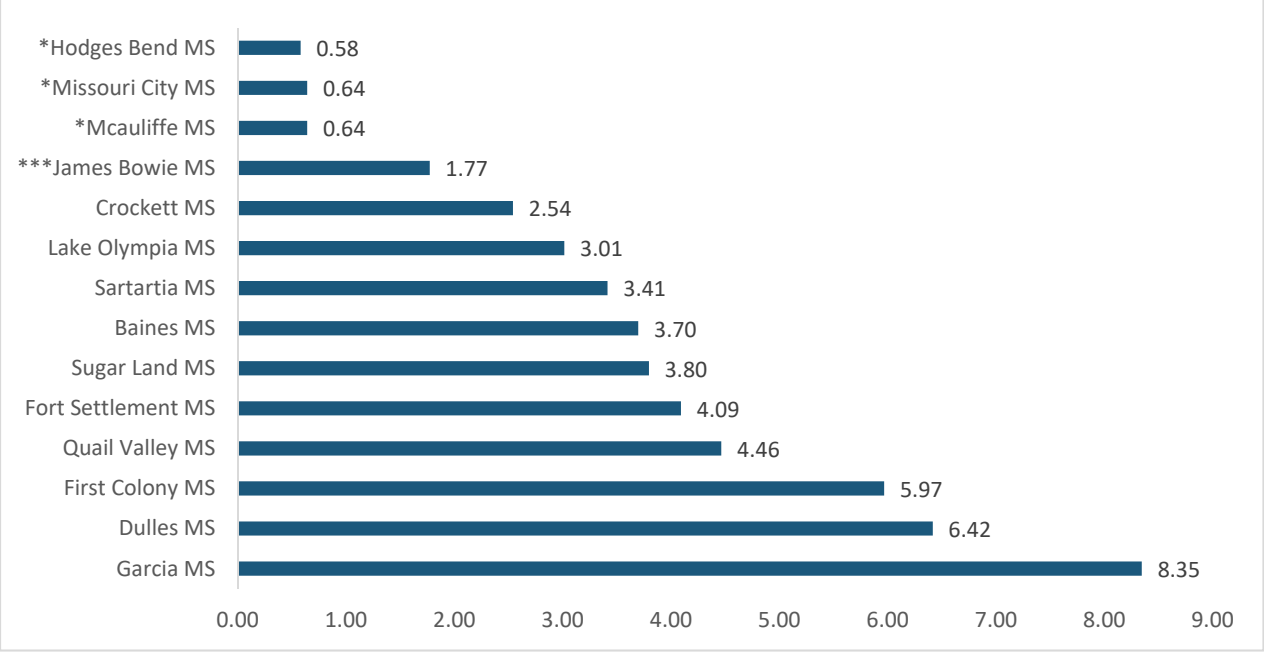
Source: Fort Bend ISD Information Technology Division Computer Inventory worksheet

Note: * 1 to 1 device pilot school

** 10 devices in all classrooms pilot school

*** 10 devices in selected classrooms pilot school

Figure 15. Student to Computer Device Ratio, Middle Schools



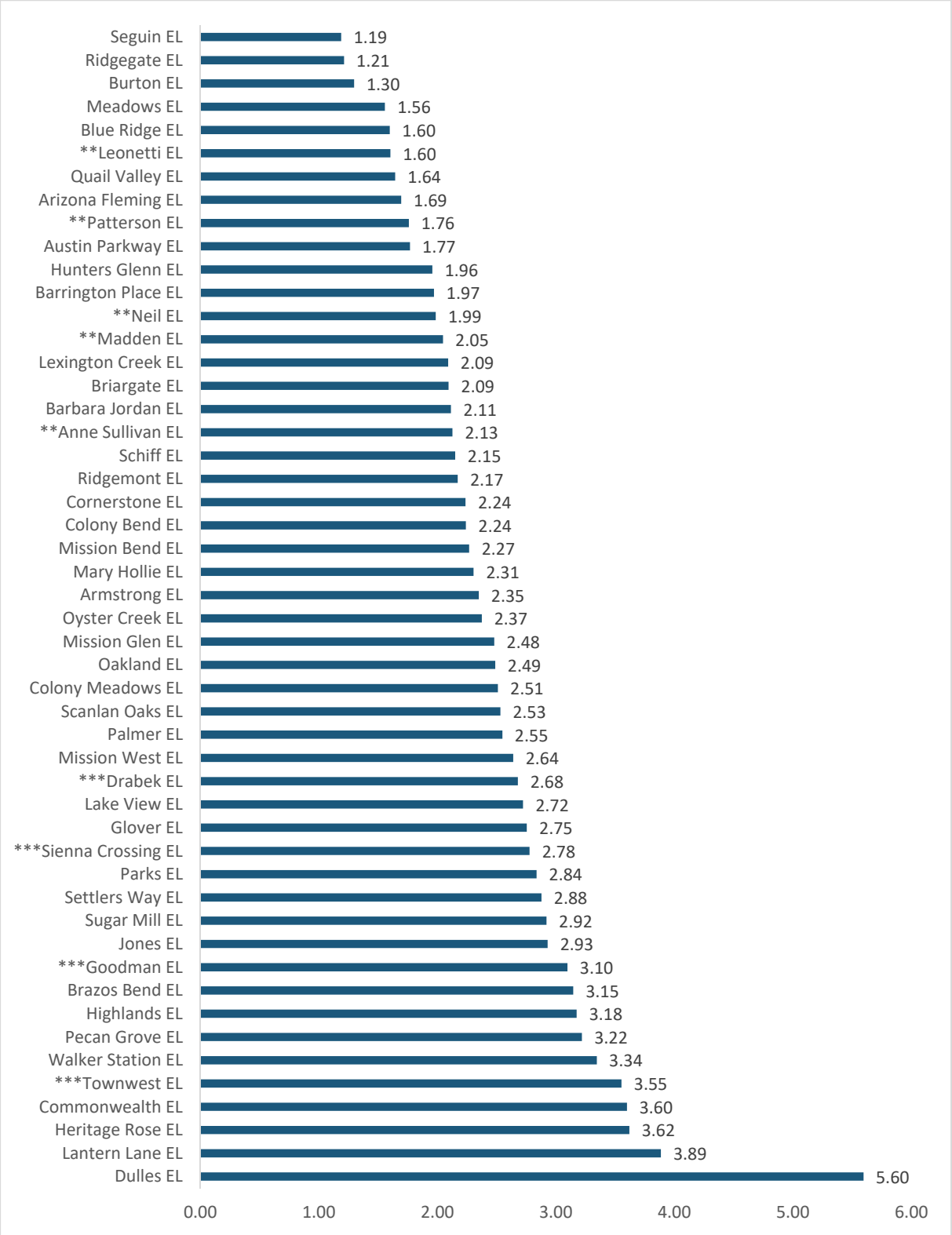
Source: Fort Bend ISD Information Technology Division Computer Inventory worksheet

Note: * 1 to 1 device pilot school

** 10 devices in all classrooms pilot school

*** 10 devices in selected classrooms pilot school

Figure 16. Student to Computer Device Ratio, Elementary Schools



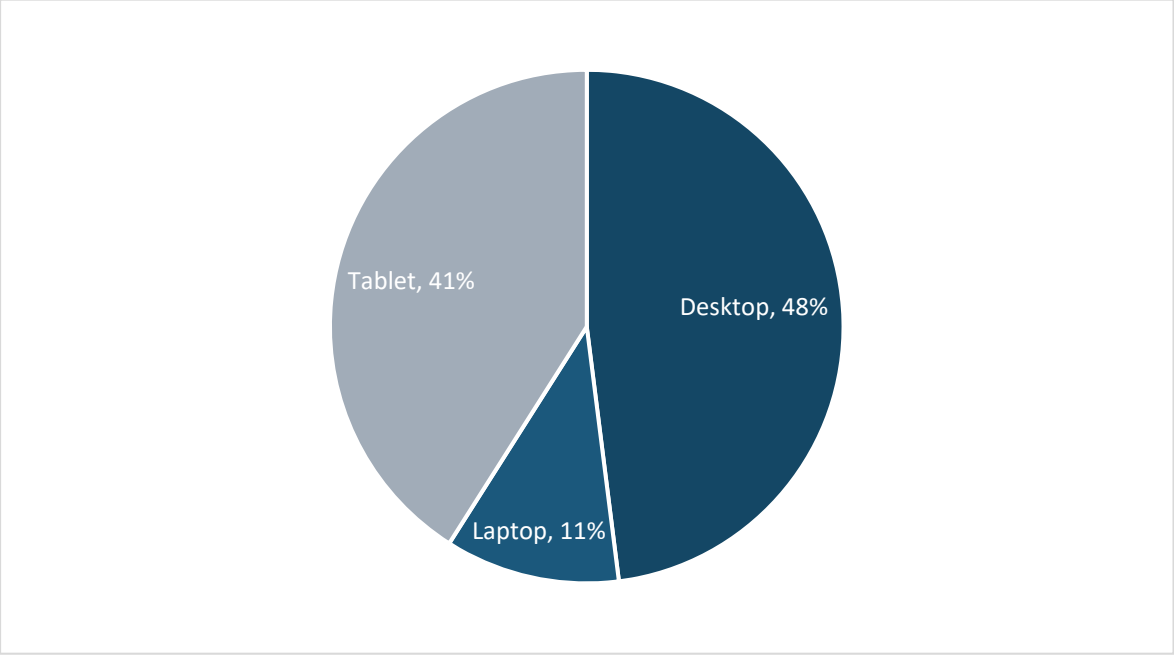
Source: Fort Bend ISD Information Technology Division Computer Inventory worksheet

Note: * 1 to 1 device pilot school; ** 10 devices in all classrooms pilot school; *** 10 devices in selected classrooms pilot schools

Even excluding the pilot schools, there is a significant variance in the student to computer device ratios. For example, while Seguin Elementary has one computer device for every 1.2 students, Dulles Elementary has one device for every 5.6 students. Neither schools are participating in a pilot study. Similar variances occur in the middle and high schools.

According to the district's fall 2017 inventory, as illustrated in Figure 17, almost half of student computer devices are desktop computers. The primary disadvantage of desktop computers is the lack of mobility which inhibits student's access to them. In addition, desktop computers take up more physical space than laptops or tablets, making it more difficult to achieve the goal of a 1 to 1 or 2 to 1 student to device ratio.

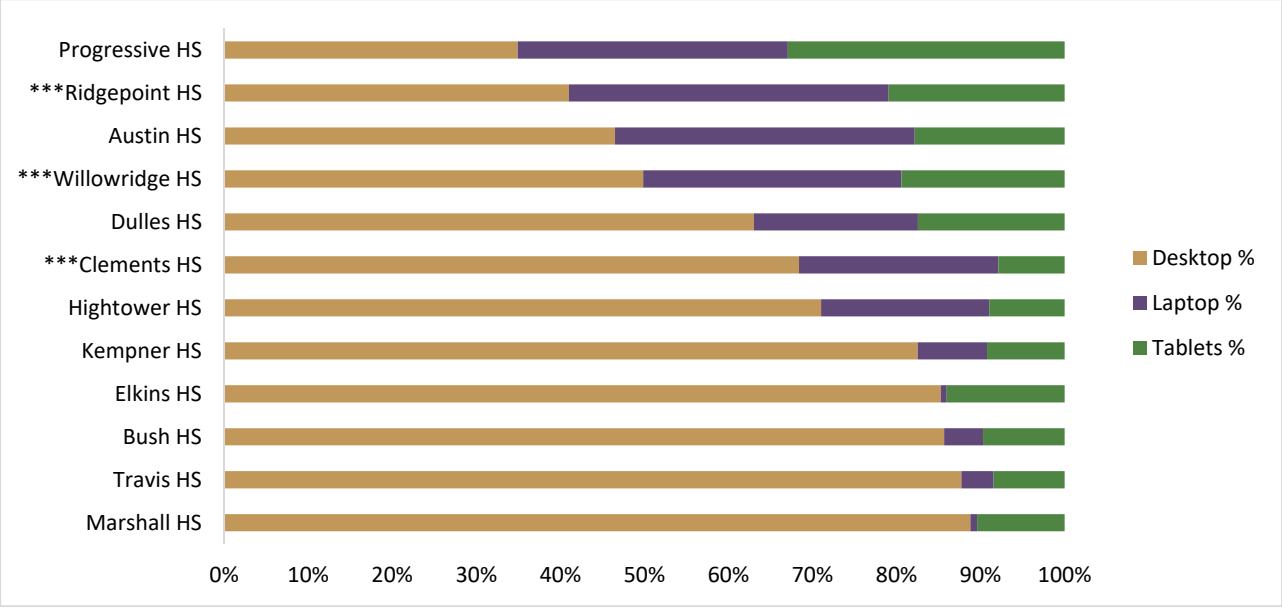
Figure 17. Distribution of Student Computer Device Types, 2017



Source: Fort Bend ISD Information Technology Division Computer Inventory worksheet, fall 2017

Although desktop computers make up 48 percent of the total student computer devices, desktop computer percentages vary greatly from one school to another – ranging from a high of 89 percent to 0 desktop computers. Figures 18, 19, and 20 show the student computer device type for each high school, middle school, and elementary school respectively.

Figure 18. Student to Computer Device Type, High Schools, 2017



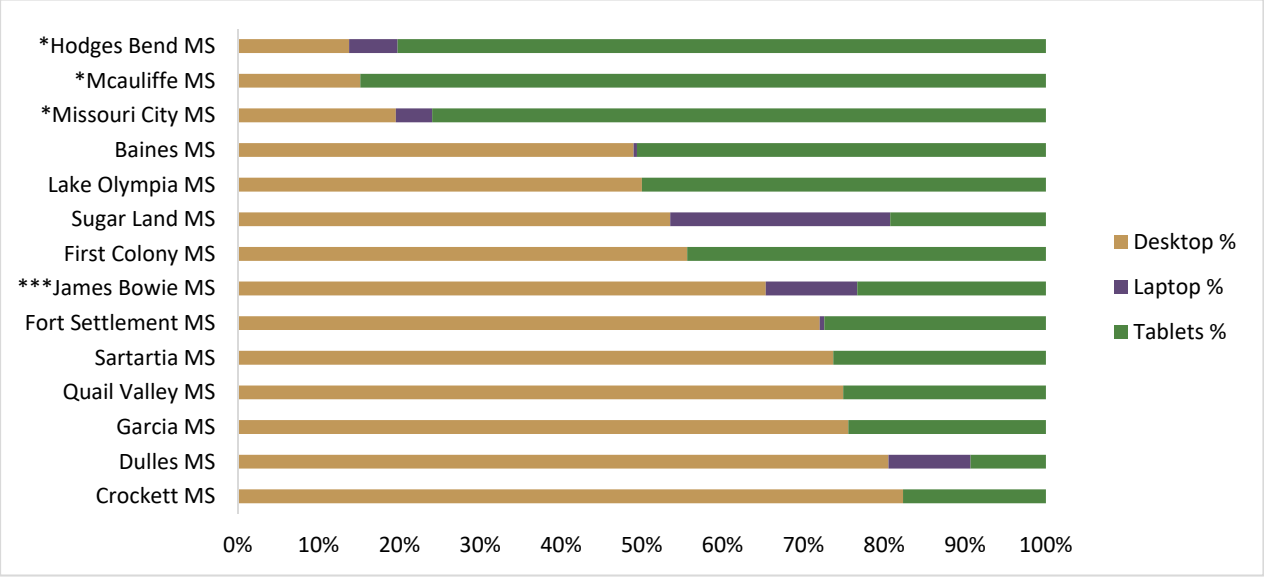
Source: Fort Bend ISD Information Technology Division Computer Inventory worksheet, fall 2017

Note: * 1 to 1 device pilot school

** 10 devices in all classrooms pilot school

*** 10 devices in selected classrooms pilot school

Figure 19. Student to Computer Device Type, Middle Schools, 2017



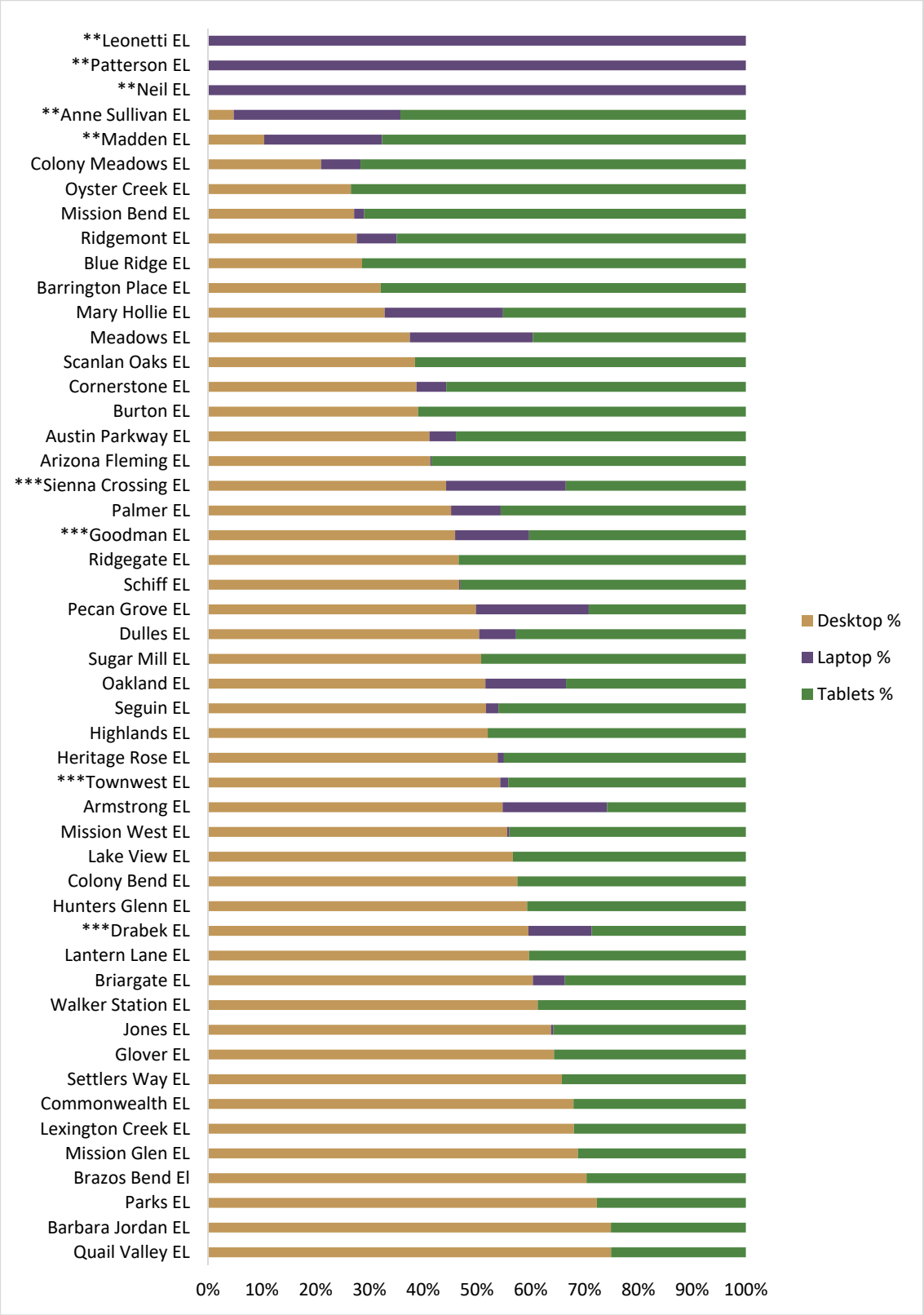
Source: Fort Bend ISD Information Technology Division Computer Inventory worksheet, fall 2017

Note: * 1 to 1 device pilot school

** 10 devices in all classrooms pilot school

*** 10 devices in selected classrooms pilot school

Figure 20. Student to Computer Device Type, Elementary Schools, 2017



Source: Fort Bend ISD Information Technology Division Computer Inventory worksheet, fall 2017

Note: * 1 to 1 device pilot school; ** 10 devices in all classrooms pilot school; *** 10 devices in selected classrooms pilot school

With aging and limited student computer devices, Fort Bend ISD will have difficulty accomplishing its strategic plan objective of using innovative teaching strategies with the integration of technology in order to provide opportunities for blended and project-based learning experiences.

Recommendation 3: Develop and implement a fully funded student computer device refresh plan that distributes devices equitably among Fort Bend ISD schools.

Fort Bend ISD has a districtwide Bring your Own Device (BYOD) program, however this program alone will not be able to solve the issues surrounding the student computer devices. The district should develop a refresh plan that considers the greatest concentration of old and desktop computers among the schools. The plan should not only address the aging and type of student computer devices but also bring all Fort Bend ISD schools to the agreed upon target student to computer device ratio in a timely manner. A good refresh plan should include a clear timeline indicating which schools will get their new devices and when. It should also include funding sources for each refresh cycle. Most refresh plans also address the movement of existing devices among schools to maintain equity among schools.

Management Response 3: *The administration agrees with this finding and supports this recommendation. Currently, the Information Technology Division and the Academic Affairs Division are revising the Education Technology Master Plan based on the findings identified at schools piloting the Blended Learning/Schoology program. The Education Technology Master Plan will contain the details of implementation and necessary funding to provide equitable devices to all schools. Beginning with the 2018-19 school year, the plan will require a three- to four-year timeline for implementation, and will be contingent upon the availability of funding.*

Finding 4: The district does not have a comprehensive disaster recovery and a business continuity plan.

Fort Bend ISD does not currently have a comprehensive disaster recovery plan which would allow the district to recover its key systems and data after a catastrophic event such as a hurricane, flood, fire, or vandalism. Although the district performs daily backups for all critical systems and has a redundant system component in place, this is not enough. The district is placing itself at risk by not having a comprehensive, well written, and tested disaster recovery plan. The district was fortunate that the data center and overall technology infrastructure were not affected by hurricane Harvey in summer of 2017. During this event, Fort Bend ISD did not experience any data loss or prolong services outages.

Important components of a comprehensive disaster recovery plan include: an established disaster recovery team; a written communication plan and procedures (including, but not limited to, a list of contacts such as key vendors and local agencies); a written list of essential hardware equipment; and configuration files and access information, such as passwords.

Table 8 includes additional information on the essential steps needed for a disaster recovery plan.

Table 8. Summary of Essential Disaster Recovery Plan Steps

Steps	Details
Build the disaster recovery team	▪ Identify a disaster recovery team that includes key policy makers, building management, end-users, key outside contractors and technical staff.
Obtain and/or approximate key information	▪ Develop an exhaustive list of critical activities performed within the division. ▪ Develop an estimate of the minimum space and equipment necessary for restoring essential operations. ▪ Develop a time frame for starting initial operations after a security incident. ▪ Develop a list of key personnel and their responsibilities.
Perform and/or delegate key duties	▪ Develop an inventory of all computer technology assets, including data, software, hardware, documentation and supplies. ▪ Set up a reciprocal agreement with comparable organizations to share equipment or lease backup equipment to allow the division to operate critical functions in the event of a disaster. ▪ Make plans to procure hardware, software and other equipment as necessary to ensure that critical operations are resumed as soon as possible. ▪ Establish procedures for obtaining off-site backup records. ▪ Locate support resources that might be needed, such as equipment repair, trucking and cleaning companies. ▪ Arrange priority delivery with vendors for emergency orders. ▪ Identify data recovery specialists and establish emergency agreements.
Specify details within the plan	▪ Identify individual roles and responsibilities by name and job title. ▪ Define actions to be taken in advance of an occurrence or undesirable event. ▪ Define actions to be taken at the onset of an undesirable event to limit damage, loss and compromised data integrity. ▪ Identify actions to be taken to restore critical functions. ▪ Define actions to be taken to re-establish normal operations.
Test the plan	▪ Test the plan frequently and completely. ▪ Analyze the results to improve the plan and identify further needs.
Deal with damage	▪ If a disaster occurs, document all costs and capture the damage by video. ▪ Be prepared to overcome downtime on your own as insurance settlements take time to resolve.
Give consideration to other significant issues	▪ Do not make a plan unnecessarily complicated. ▪ Make one individual responsible for maintaining the plan, but have it structured so that others are authorized and prepared to implement it if needed. ▪ Update the plan regularly and whenever changes are made to your system.

Source: Adapted from the Technology and Security Task Force, National Forum on Education Statistics, "Safeguarding your Technology"[2], fall 1998.

The district is also lacking a business continuity plan which is a more granular plan where key business

[2] http://nces.ed.gov/pubs98/98297.pdf

units, such as payroll and human resources, continue to operate after catastrophic events and any other business interruptions, such as a server failure or cyber-attack. Key business units or functions/divisions may have varying technical and data needs during an interruption or outage and varying expectations as to how long they can stay down in the event of technical failure or data loss.

According to the Department of Homeland Security[3], development of a business continuity plan includes four steps:

1. Conduct a business impact analysis to identify time-sensitive or critical business functions and processes and the resources that support them.
2. Identify, document, and implement steps to recover critical business functions and processes.
3. Organize a business continuity team and compile a business continuity plan to manage a business disruption.
4. Conduct training for the business continuity team and testing and exercises to evaluate recovery strategies and the plan.

Figure 21 details each of the four steps in building a business continuity plan.

Figure 21. Steps to Build a Business Continuity Plan

Source: Federal Emergency Management Agency (FEMA) Ready.gov website

Recommendation 4: Develop a comprehensive disaster recovery and business continuity plan and test it periodically.

To successfully implement this recommendation, Fort Bend ISD should first establish a disaster recovery and business continuity planning committee. During the planning process the committee should classify applications and systems into categories such as mission critical, critical, essential, and non-critical. These categories indicate how important the application or system is to the district's operation and whether or not the application or system functions can be performed manually. The division should then determine

[3] ready.gov

the desired restoration timeframe for each category. Results of these discussions will be the primary drivers of the scope of the plans and the financial cost to the district for implementing the disaster recovery and business continuity plans. Once plans have been developed, the district should periodically test the plans to ensure information contained in each are up-to-date and all systems and equipment are functioning as expected.

Management Response 4: *The administration agrees with this finding and supports this recommendation. By the end of the 2018-19 school year, the Information Technology Division will work with its stakeholders to identify and develop the disaster recovery and business continuity plan for its Tier 1, mission critical services. Disaster recovery and business continuity planning for other essential and non-critical services will be prioritized and addressed in order of importance as determined by the stakeholders.*

Section 3 – Technology Support Services

Background

Technology support services in Fort Bend ISD are provided by both the Information Technology Services Group and the Information Systems Group. Support services are coordinated by the Customer Service Center (CSC). The division uses PeopleSoft's Customer Relations Management (CRM) system to generate and track work orders/tickets for technology-related support service requests. The Customer Service Center functions as the help desk and first line of support for most technology-related support requests. District staff can open a support ticket via the CRM system or reach the CSC via phone or email. The CSC staff can troubleshoot and resolve most requests; however, any request that cannot be resolved are escalated to the appropriate technology support group via the district's CRM.

Although the district technology work orders increased 25.5 percent from 2014-15 to 2016-17, the average days to close a work order decreased 18.8 percent – from 6.9 days to 5.6 days – during this same time period. Table 9 shows the total number of work orders and average days to close a work order over the last 3 years.

Table 9. Number of Closed Work Order Tickets, 2014-15 to 2016-17

	2014-15	2015-16	2016-17	% Δ
Number of closed work orders	80,223	90,764	100,688	25.5%
Average days to close a work order	6.9	6.5	5.6	(18.8%)

Source: Fort Bend ISD CRM work order system, fall 2017

More than 90 percent of the work order tickets are generated for customer service, desktop support, and administrative application support. Table 10 shows the number and percentage of work orders by category. The highest increase in work orders occurred in customer service (32%) and desktop support (41%).

Table 10. Number and Percentage of Work Order Tickets by Category, 2014-15 to 2016-17

Category	2014-15		2015-16		2016-17		% Δ
	#	%	#	%	#	%	
Customer Service	32,475	40%	37,305	41%	42,878	43%	32.0%
Desktop Support	26,567	33%	28,682	32%	37,396	37%	40.8%
Administrative Application Support	11,137	14%	14,807	16%	12,325	12%	10.7%
Other	10,044	13%	9,970	11%	8,089	8%	-19.5%
Total	**80,223**	**100%**	**90,764**	**100%**	**100,688**	**100%**	**25.5%**

Source: Fort Bend ISD CRM work order system, fall 2017

Average days to close a work order has decreased in two of the major categories: Desktop Support and Administrative Application Support. There is an increase in the "Other" category which makes up for only 8 percent of all closed work orders in 2016-17.Table 11 shows the average days to close a work order on

those four categories.

Table 11. Average days to close a Work Order Ticket by Category, 2014-15 to 2016-17

Category	2014-15	2015-16	2016-17	Change
Customer Service	1	1	1	-
Desktop Support	10	9	8	(2)
Administrative Application Support	8	6	7	(2)
Other	16	20	19	3

Source: Fort Bend ISD CRM work order system, fall 2017

Table 12 shows the breakdown of closed tickets by the different technology support groups. More than 87 percent of all closed tickets in 2016-17 fell under the Customer Service Center, Desktop Support, and Skyward Support groups.

Table 12. Percentage of Closed Work Order Tickets by Assignment Groups, 2014-15 to 2016-17

Groups	2014-15	2015-16	2016-17
Customer Service Center	40.5%	41.1%	42.5%
Desktop Support	37.5%	35.1%	38.9%
Skyward Support	5.5%	5.8%	6.4%
Other	16.5%	18.1%	6.4%
Total	**100%**	**100%**	**100%**

Source: Fort Bend ISD CRM work order system, fall 2017

Table 13 shows the work order ticket break down by school/school type and non-school (divisions) locations. Sixty-four percent of all work order tickets are generated at the schools.

Table 13. Number of Closed Work Order Tickets by Location, 2014-15 to 2016-17

	2014-15	2015-16	2016-17
Non-School	**28,042**	**31,292**	**35,818**
School	**52,181**	**59,472**	**64,870**
Elementary	*22,491*	*25,861*	*28,345*
High	*16,692*	*20,157*	*21,367*
Middle	*12,998*	*13,454*	*15,158*
Grand Total	**80,223**	**90,764**	**100,688**
School Work Orders as a % of the Total	65.0%	65.5%	64.4%

Source: Fort Bend ISD CRM work order system, fall 2017

Audit Findings and Recommendations

Finding 5: The Information Technology Division does not have an information technology service catalog.

The Information Technology division does not have a service catalog for all the technology services that they offer and support. Without a service catalog, district staff may not know what services are offered by which group within the division.

In addition to being a guiding document for district staff outside of the Information Technology Division, an information technology service catalog can also be used by division staff to identify which groups are responsible for which technology service. For example, the ERP system group may be responsible for maintaining and updating the district's ERP system; however, maintaining the ERP system server's health and operating system could be responsibility of another group.

Many technology departments in all sectors, including K12 education, use technology service catalogs. Figure 22 shows a sample information technology catalog.

Figure 22. Sample Technology Service Catalog

Source: Irving ISD website, fall 2017

Recommendation 5: Develop an information technology service catalog and make it available to district staff.

A typical information technology service catalog should include the following information for each service.

- Service description
- Service category
- Service audience
- Contact information for main service provider
- Service availability (hours and days)
- Service Level Agreement
- Service cost if applicable
- Service Frequency (if applicable)
- Service related documentation

The Information Technology Division should compile all relevant information related to the services they provide and publish the information on the district's internal website and made accessible to all district staff. The catalog should be updated as the division adds new services or makes any changes to existing services.

Management Response 5: *The administration agrees with this finding and supports this recommendation. By the end of the 2018-19 school year, the Information Technology Division will complete its service catalog, making it available to all district personnel. The division has already begun work on the catalog and will incorporate the suggestions listed in the report's findings.*

Finding 6: The Information Technology Division does not have complete service level agreements for their technology services.

The primary purpose of a service level agreement (SLA) is to provide an objective measure of performance and service accountability. A well-defined SLA should include, at a minimum, the following components:

- Service definition and service hours
- Priority definitions based on impact and urgency
- Response and resolution target times
- Service provider team member responsibilities
- Escalation process
- Service measuring and reporting

The Fort Bend ISD Information Technology Services Group has a work order escalation procedure which includes components of a service level agreement: response and resolution target times, service provider team responsibilities, and an escalation process. However, it does not include the following components: definition of what technology services are covered, service days and hours, priority definitions based on impact and urgency, how to assign a proper priority to a work order, and how to measure service levels

and report the results.

The Information Technology Division provides a variety of services. The Technology Support Group provides help desk support, desktop support, and infrastructure support including telecommunications, data and network services, and servers. The Information Systems Group provides application support and reports to both business and student information system users. Due to the technical nature and the divisions staffing levels, different service level agreements may be needed for different services.

It was noted by district and campus staff that the Information Technology Services Group's escalation process and related service response and resolution targets are not fully communicated to district users. Without a complete service level agreement, that is clearly communicated, it is difficult to measure the division's technical services performance or determine appropriate staffing levels.

Recommendation 6: Develop complete service level agreements for all services the Information Technology Division provides to district users.

The division should work with technology services customers to ensure response and resolution times and service hours are acceptable and attainable with current staffing levels of each technical service area. This will determine whether or not the division needs one SLA or multiple service level agreements for each technical service.

The division should add the service definition and hours, priority definitions, and service measuring and reporting components to the current escalation process. Figure 23 provides sample priority definitions based on impact and urgency. The division should create their own matrix so that customer service representatives can correctly identify and classify work orders to the right priority.

Figure 23. Sample Priority Definitions

Impact / Urgency	**Extensive** Service is out for Enterprise	**Significant** Service is out for many users or degraded for Enterprise	**Moderate** Service is out for 1 user or degraded for many	**Localized** Service is degraded for 1 user
Critical *Based on event*	**Priority - Critical** Respond – 1 H Resolve – 5 H	**Priority - High** Respond – 4 H Resolve – 35 H (1.5 D)	**Priority - Medium** Respond – 8 H Resolve – 97 H (4 D)	**Priority - Medium** Respond – 8 H Resolve – 97 H (4 D)
High *Required*	**Priority - High** Respond – 4 H Resolve – 35 H (1.5 D)	**Priority - High** Respond – 4 H Resolve – 35 H (1.5 D)	**Priority - Medium** Respond – 8 H Resolve – 97 H (4 D)	**Priority - Low** Respond – 8 H Resolve – 172 H (7 D)
Medium *Important*	**Priority - Medium** Respond – 8 H Resolve – 97 H (4 D)	**Priority - Medium** Respond – 8 H Resolve – 97 H (4 D)	**Priority - Medium** Respond – 8 H Resolve – 97 H (4 D)	**Priority - Low** Respond – 8 H Resolve – 172 H (7 D)
Low *Desirable*	**Priority - Medium** Respond – 8 H Resolve – 97 H (4 D)	**Priority - Low** Respond – 8 H Resolve – 172 H (7 D)	**Priority - Low** Respond – 8 H Resolve – 172 H (7 D)	**Priority - Low** Respond – 8 H Resolve – 172 H (7 D)

Source: An Example of priority definitions, response and resolution targets from an IT support organization

The division should also run periodic reports from the work order system and phone system to measure response and resolve times by priority and compare actual performance to the service level targets. The division should publish the results to its customers and let them know how each technical service group is doing against its service level targets.

Management Response 6: *The administration agrees with this finding and supports this recommendation. The Information Technology Division is currently working to finalize the priority levels of support and the framework for a service level agreement (SLA). The initial draft of the SLA will be available by December 2018. After the completion of the SLA framework, it will be modified, if necessary, for the various levels of support and published for all district personnel, as well as included in the service catalog.*

Finding 7: The Information Technology Division work order system contains two sets of prioritization options.

The Information Technology Division technology work order system has two sets of prioritization options for work orders. This not only may lead to confusion for staff who utilize the work order system but also makes it difficult to analyze work order data in terms of priority. The work order system has priority designations ranging from 0 to 5, separate named priority categories (low, medium, high, immediate), and project. Table 14 shows the priority designations of all work orders from 2014-15 to 2016-17.

Table 14. Number and Percentage of Work Orders by Priority, 2014-15 to 2016-17

Priority	2014-15		2015-16		2016-17	
	#	%	#	%	#	%
0	5	0.0%	7	0.0%	5	0.0%
1	105	0.1%	447	0.5%	253	0.3%
2	131	0.2%	1,098	1.2%	857	0.9%
3	59,584	74.3%	65,364	72.0%	56,240	55.9%
4	93	0.1%	72	0.1%	34	0.0%
5	14,946	18.6%	15,407	17.0%	17,216	17.1%
Immediate	6	0.0%	4	0.0%	26	0.0%
High	282	0.4%	1,535	1.7%	1,206	1.2%
Medium	4,542	5.7%	6,242	6.9%	5,343	5.3%
Low	470	0.6%	582	0.6%	19,507	19.4%
Project	59	0.1%	6	0.0%	1	0.0%
Total	**80,223**	**100.0%**	**90,764**	**100.0%**	**100,688**	**100.0%**

Source: Fort Bend ISD CRM work order system, fall 2017

In 2017, the division defined their escalation process noting priority categories, response and resolution times, and division escalation assignments. This document referred to only the four named priority categories. However, the work order data shows that all 11 categories are still priority options within the system. Measuring performance against the district's escalation process standards is difficult with two sets of priority work order categories.

Recommendation 7: Select one set of priority designation options and ensure the work order system reflects only those designations.

The division should decide on one set of priority designations and change the work order system to reflect those designations. The division should communicate to its staff the priority destinations so they are clear on which destinations the division is using and what those designation's response and resolution targets are.

Management Response 7: *The administration agrees with this finding and supports this recommendation. The Information Technology Division is finalizing a standard set of priority designations, and it will be applied to the new work order system. By the start of the 2018-19 school year, the new set of designations and the new work order system will be available online for its first pilot group.*

Section 4 – Applications

Background

There are hundreds of applications available to assist school districts to perform their day-to-day functions. Most school districts use a student information system (SIS) which typically consists of many integrated modules such as scheduling, gradebook, attendance, discipline. In addition to a SIS, districts use a business application that usually contains integrated modules such as human resources, finance, payroll, budgeting, and position control. These two applications are used districtwide and touch almost all areas of school operations. School districts also use more specialized applications such as time keeping, facilities and maintenance management, work order ticketing, special education student management, career and college planning, among others. When properly selected and implemented, these applications improve the speed and accuracy of the school district operations and also helps them to be more efficient by eliminating manual processes.

Fort Bend ISD currently uses Skyward as their SIS. Skyward is hosted by the 3rd-party colocation vendor and the physical servers that run the application are located in vendor's data center. The district connects to Skyward via internet. Skyward has recently announced a major release of their application which will add new functionality and make changes to their existing database technology and structure. While the district believes they will benefit from this release, they decided to run tests to ensure the new release not only works but does not negatively affect any existing functionality. This verification and testing phase is the first part of the district's SIS upgrade plan. At the time of this audit, the Information Technology Division has placed the upgrade on hold based on the results of the verification/testing phase.

Since 2007, Fort Bend ISD has been using PeopleSoft as their primary business application to manage key functions such as finance, human resources, payroll, and budget. The PeopleSoft application resides on the district's servers in the district's data center. During the audit, division leadership stated that even though they believe the PeopleSoft application is stable and serving their needs, they are reviewing new functionalities and applications that can be options for the district in the future.

In addition to these primary applications, Fort Bend ISD uses 394 applications including instructional, IT support, and productivity, among others provided by 140 different vendors. Table 15 lists the type and number of applications from the district's application inventory list.

Table 15. Number and Type of Applications

Application Type	#
Instructional	258
Business Information System	64
IT Support	24
Student Information Systems	19
Productivity	18
Other Systems	11
Total	**394**

Source: Information Technology division Fort Bend ISD application inventory list, fall 2017

The district also has different types of licenses for these applications. While some applications have districtwide licenses, some are campus or division based. There are also licenses based on number of Central Processing Units (CPUs) on the server on which the application resides. The district has 40 applications that are hosted by the application vendor, not by the district. While there are several benefits of using a hosted application such as lower hardware and maintenance costs, there can be risks related to data security since hosted applications house district data in their location. In order to address this potential risk, the district has developed a detailed data protection agreement that protects the district against data issues that may be caused by the hosted vendor. The audit team performed a test regarding hosted application vendors with data protection agreements (see *Section 6: Technology Audit Testing*).

Until 2017, the Digital Learning Department was handling the application acquisition request from the campuses through the districts "Softevalform". The department would evaluate the request and approve the application to be purchased. Since the reorganization of that department, the Teaching and Learning Division's Instructional Resources Group is in the process of rewriting the application acquisition procedure. In the meantime, any application purchases that are flagged because it is a technology requisition are routed to the Information Technology Division by PeopleSoft for approval. According to the Information Technology Division, they work with the Instructional Resources Group in the Teaching and Learning Division to ensure that the application is aligned with the written curriculum and software vendor is approved.

Audit Findings and Recommendations

Finding 8: Fort Bend ISD's technology plan does not address administrative applications.

Since the Federal Communications Commission no longer requires a comprehensive long-range technology plan from districts in order to receive benefits from the School and Library E-Rate program, most districts do not have a comprehensive technology plan. Fort Bend ISD has two technology master plans that address educational technology and technology infrastructure. Although these two plans cover the majority of the technology related areas, they do not address districtwide non-instructional applications.

The most essential districtwide non-instructional applications include the SIS and ERP system. The SIS is

used by the majority of district staff and manages the master schedule for classes, transcripts, grades, and many more school related functions. The ERP system manages finance, human resources, payroll, purchasing, and many other district key business functions. These two applications are the backbones of any school district operations. If implemented and used properly, these systems can help automate district operations and make the district staff more efficient – saving time and money.

As mentioned previously, Fort Bend ISD is planning on a major update for their current SIS and also plans to review options to improve ERP system capabilities. These are multiyear major non-instructional application initiatives that are not in the district's major technology plan.

Without a plan for non-instructional districtwide applications, it is difficult to communicate and manage resource and financial implications of these initiatives.

Recommendation 8: Develop a technology plan component for non-instructional districtwide applications.

Fort Bend ISD's technology steering committee should work with key stakeholders such as administrators, principals, teachers, and community members to develop a plan component to address districtwide non–instructional applications. Going forward, this plan component should be included in Fort Bend's overall technology plan.

The primary reason to develop a plan is to assess where the district is now and where it would like to be in the future with respect to non-instructional applications. Following are some of the main components of a plan:

- Needs assessment
- Goals and measurable objectives
- Key initiatives and resource requirements (e.g., hardware, software, and facility)
- Assigned roles and responsibilities
- Funding requirements

Overtime, as the district's technology needs evolve, the plan should be reassessed and revised.

Management Response 8: *The administration agrees with this finding and supports this recommendation. By the end of the 2018-19 school year, the Information Technology Division will complete an application-specific master plan. Since there is a large number of applications being used by the district, the technology plan for non-instructional districtwide applications will be aligned to the overall plan created for vital applications including Student Information System, Enterprise Resource Planning, etc., as determined by the stakeholders.*

Section 5 – Technology Audit Testing

The audit team executed two tests in the Information Technology Division. The purpose of the audit tests was to review the non-employee access levels to the district's systems and data, ensure all vendors with access to data agree to district wide data sharing protocols and procedures, as well as to obtain tangible evidence of how documentation is maintained within the Information Technology Division. This section of the report outlines each of the tests executed and the findings from such tests. All documentation used in testing was provided to the audit team by Fort Bend ISD Information Technology Division staff.

Test 1 – Non-Employee (Consultant) Active Directory Access

The objective of this test was to ensure that non-employees (Consultants) are properly granted access to the Active Directory. In order to perform this test, the audit team obtained a listing of all non-employees that were granted Access to the Active Directory in 2016 and 2017. From this population the audit team selected 10 non-employees. For each selection the audit team validated the following:

1. The district employee requesting access was appropriate.
2. The Acceptable Use Policy form was signed by the consultant
3. Access provided was given a termination date and the access period was reasonable.

Below is a summary of the findings from this test:

- Four accounts (of 10 sampled) did not have an access termination date.
- The district had no record or documentation of three accounts selected. One account selected was hired as a full-time employee for the district 22 months after the account was created. One account selected was disabled about 20 months after the account was created. One account selected was disabled approximately 1-week after the account was created.
- One account selected had an improper access termination date. The selected account was disabled about one month after the position terminated.

Test 2 – Contracts with Data Sharing Vendors

The objective of this test was to ensure that Fort Bend ISD's third party software vendors are appropriately using and protecting the district's data. In order to perform this test, the audit team obtained a listing of all Fort Bend ISD cloud based third party vendors and selected a sample of five. The following tests were performed for each selection:

1. Validate that there is there a documented agreement between Fort Bend ISD and the third party software vendor, and it is current (i.e., it has not expired).

2. Validate that the contract agreement between Fort Bend ISD and the third party software vendor was properly signed by the vendor and the appropriate Fort Bend ISD personnel.

3. Validate that there is a data protection/termination clause within the agreement that explains how FBISD's data is to be destroyed/returned to the District upon termination of the agreement.

Below is a summary of the findings for the five vendors selected:

- Four out of the five vendor contracts did not include a data protection/termination clause or agreement within the executed contract.
- One vendor contract expired on 6/30/2017 and a new current contract was not executed even though services continued. The district, however, was able to provide an up-to-date copy of the current sales order.

Findings and Recommendations:

Finding 9: Not all non-employee (Consultant) Active Directory access accounts are assigned a termination date.

During audit testing, the audit team obtained the list of all non-employee (Consultant) accounts created during 2016 and 2017. A total of 29 accounts were not assigned a termination date. During audit testing, 10 accounts were randomly selected and 4 accounts selected did not have a termination date. According to the district, it is a district established policy that all accounts must be assigned a termination date, typically 3 to 6 months after the account is created, unless the position requires a longer defined period.

Recommendation 9: Assign termination dates to all non-employee (Consultant) accounts.

The district should ensure that all non-employee (consultant) accounts created are assigned a termination date. This ensures that all non-employees who have access to the active directory, only have access for a defined period of time. If the position gaining access does not have a defined termination date set forth by the requestor, the district should establish a time period that is assigned to all accounts. This time period should be reasonable based on the position or assignment. The district could also begin requiring the requestors to assign a termination date when requesting access for non-employees (consultants). The district should also identify all active non-employee (consultant) accounts without a termination date and assign a reasonable date to terminate access.

Management Response 9: *The administration agrees with this finding and supports this recommendation. By the start of the 2018-19 school year, the Information Technology Division will implement a process to assign termination dates for all non-employee (consultant) accounts.*

Finding 10: The district does not maintain documentation for all non-employee (consultant) accounts created.

During audit testing, the audit team selected 10 non-employee (Consultant) accounts with access to the Active Directory. The district did not have any record or documentation of 3 of the 10 accounts created. The district was able to track that one account was linked to a full-time employee that was hired 22

months after account creation. The other two accounts were terminated, one 22 months after and one approximately one week after creation. Documentation provided by the district included copies of e-mails requesting access.

Recommendation 10: Create and maintain formal documentation for all non-employee (Consultant) account requests.

The district should create a formal document or online process that is required for all requestors to submit when requesting access for a non-employee (consultant). This document should include the requestors name and title, name of non-employee and position, length of position, and access termination date. This should also be approved the Information Technology division. The district should maintain records of all requests. This should also include the level of access needed for the consultant. In order to maintain proper documentation for accounts created and prohibit consultants from gaining access to information not necessary, the district should implement a more formal and detailed requesting process. With the implementation of the requesting document and process, the district should have record of all non-employee accounts that are created and will be able to ensure the appropriate level of access is granted to all non-employees.

Management Response 10: *The administration agrees with this finding and supports this recommendation. By the start of the 2018-19 school year, the Information Technology Division will implement a process to create and maintain formal documentation for all non-employee (consultant) account requests.*

Finding 11: The district does not timely terminate all non-employee (consultant) accounts.

During audit testing, Gibson selected 10 non-employee accounts for testing. 1 account selected for testing had an improper termination date. The account selected had a termination date of July 2018, however the e-mail requesting access stated that the position terminated June 2018, one month later.

Recommendation 11: Ensure all non-employee (consultant) accounts are terminated in a timely manner.

The district should ensure that access granted to non-employees (consultants), expires upon termination of the position. Though it is reasonable to have a few days in between due to processing, the account should be terminated shortly after the employee leaves the position. This ensures that access is not granted to someone that should not be viewing district data. The district should ensure that all termination dates for non-employees (consultants) match the date given at the time of the initial request.

Management Response 11: *The administration agrees with this finding and supports this recommendation. By the start of the 2018-19 school year, the Information Technology Division will implement a process to terminate non-employee (consultant) accounts in a timely fashion.*

Finding 12: Fort Bend ISD does not have signed data protection agreements with all vendors with whom they share data.

A data protection agreement is a formal contract that clearly documents what data is being shared and the parameters around the intended use of the data. This includes specifications related to any constraints on the use of data, confidentially and required safeguards, security and access, methods and for data sharing, as well as timelines for destruction of data. Data projection agreements are critical to ensuring that vendors that receive district data understand and accept their responsibilities, as well as providing legal protection for the district in case vendors' systems are somehow compromised.

During audit testing, the audit team obtained a list of all vendors the district currently shares data with. The audit team selected five vendors and examined the corresponding contracts. Of the five vendors selected, only one vendor contract contained the district's established data protection agreement. The district's established data protection agreement highlights proper data use for the vendor, instructions in case of a security breach, and responsibilities of the vendor after termination or expiration of contract.

Recommendation 12: Ensure all vendors who the district shares data with sign the district data protection agreement.

The district should ensure that Fort Bend ISD's data protection agreement is included in all district contracts who partake in data sharing. The district should also require vendors to separately sign the agreement outside of the contract. Currently, the data protection agreement is included within the contract and the vendor does not have to sign the document. The data protection agreement is critical to establish policies surrounding data sharing and to ensure policies are addressed in regards to vendor rights, termination processes and data transfer, as well as many other topics. The district should go through all active contracts and get vendors to sign the district data protection agreement if they have not already done so. This data protection agreement should be included in all new contracts going forward, as well as, any contracts that are renewed or extended.

Management Response 12: *The administration agrees with this finding and supports this recommendation. The Information Technology Division, in conjunction with the Legal Department, has completed a data protection agreement. The Information Technology Division will work with stakeholders, the Procurement Department, and the Legal Department to ensure that all new and renewing contracts include the data protection agreement. The process is currently in place and this is an ongoing effort.*

Finding 13: Not all district vendors have an up-to-date contract.

During audit testing, the audit team obtained a list of all vendors with whom the district shares data and selected five vendors for further review. Of the five vendors selected, one did not have an up-to-date contract. This contract expired in June 2017, however, services continued after expiration. The district provided a sales order form that highlighted the repurchase of the vendor's services and products; however, a new contract was not executed.

Recommendation 13: Ensure all district technology vendors sign new, up-to-date contracts.

The district should ensure that all expired contracts are renewed if services continue. A district established contract is imperative for all vendors to ensure the district's rights are set forth, there is established contract period, and an agreement on costs is reached. The district's data protection agreement is also included in many contracts, therefore, it is also important from a data protection standpoint to ensure that all current vendors also have a corresponding up-to-date contract. The district should review all current data sharing vendor files to ensure all have an up-to-date contract. If not, the district should execute a new contract. All contract should be up-to-date with any new district edits included.

Management Response 13: *The administration agrees with this finding and supports this recommendation. The Information Technology Division will continue to work with stakeholders, the Procurement Department and the Legal Department to ensure that all new and renewing Information Technology contracts are up-to-date. The process is currently in place and this is an ongoing effort.*

Appendix A – Interview Roster

Interviewee	Title
Mitzi Patin	Executive Director Information Systems
Jojo Jacob	Director Information Technology Services
Long Pham	Chief Information Officer
Chris Kar	Security Advisor
Julie Guillory	Director Student Attendance /PEIMS
John Miday	Manager Integration Architect
Barbara Benzaia	Manager Student Information Systems
Rick Sanders	Manager Data Integration
Sandy Reyes	Manager Business Systems
Abraham Carson	Manager Application Services
Matt Fraser	Manager Web Services
David Major	Manager Desktop Technology
Alvin Williams	Manager Desktop Support
Jimmy Garcia	Manager Customer Service Center
Greg Gonsoulin	Manager Network Services
Steven Bassett	Chief Financial Officer
Oscar Perez	Chief Operations Officer
Rarish Patel	Manager Data Center
Elementary Principal Focus Group	N/A
Secondary Principal Focus Group	N/A
User Support Analyst Focus Group	N/A
Network Engineer/Unified Communication Focus Group	N/A
Diana Sayavedra	Chief Academic Officer
Kermit Spears	Chief Human Resources Officer