

“At the heart of effective technology integration, technology offers opportunities to be more actively involved in the learning experience.”

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Technology Blueprint 2016-2020

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INTRODUCTION

Teaching and learning through innovative technology is a phrase adopted by Niagara Catholic to signal change in practices relating to the use of technology in both the academic and corporate sectors of our Board. In this constantly evolving digital world new demands on teaching, learning and capacity building have encouraged additional investments through the Board approved Budget, the development of technology strategies, programs and services that best prepare our students for success, along with supporting the operational administrative functions of the Board.

Today's learners are immersed in technology creating a high level of expectation that classrooms and the working environment be equipped with digital tools that enhance their educational and work experience. Our curriculum and instructional strategies are evolving to reflect these expectations.

The revised Technology Blueprint 2016-2020 outlines an ambitious, multi-year strategic Technology Blueprint that addresses both academic and corporate needs for teaching, learning and improved efficiencies. This Blueprint provides direction, strategies and proposed capital investments to ensure that appropriate technology resources and services are deployed in support of student success and business continuity. This report is presented as part of a multi-year strategic plan that aligns with the Board's Vision 2020 Strategic Plan, corporate vision and system priorities.

This Technology Blueprint will be reviewed regularly to ensure that it continues to remain both valid and progressive over the next four years. Modifications will be made as needed to reflect changes in the teaching, learning and corporate environment.

VISION

This vision sets the foundation for Niagara Catholic's Technology Blueprint and is reflected in all of the proposed strategies and initiatives in this document.

Education helps prepare students for the next generation by teaching them the skills required for knowledge acquisition and problem solving. Within the Catholic context, digital discipleship helps to ensure that the technology is used responsibly, with integrity and in a way that respects the dignity of others. Many of today's students will work in jobs that do not currently exist, whereas those that do exist will likely be very different; hence, as society becomes more heavily dependent on technology it is our responsibility to do our best to prepare our children for this reality.

A child's ability to adjust to the demands of a technology centric world, understand the technology, and apply the technology with competence must be a vital part of the educational experience formed within our Catholic learning environment.



TERMS OF REFERENCE

- ▶ The use of digital technology enhances and improves instruction and learning and the ability to solve problems.
- ▶ Digital technology is not a replacement for effective teaching, but is one tool in an effective teacher's toolbox. It helps teachers personalize instruction for students.
- ▶ Learning should not be restricted to the walls of the classroom.
- ▶ Digital discipleship is an important skill for students to be able to respectfully use technology.
- ▶ Students/teachers/administrators should be able to collaborate using a variety of platforms.
- ▶ Digital technology should be mobile, at the point of learning.
- ▶ All students should have access to digital technology within the school and be able to bring devices from home, to support their learning.
- ▶ The wireless network infrastructure should be robust and support three devices per person in the school.
- ▶ When used respectfully, social media enhances collaboration and supports learning.
- ▶ Environmental stewardship is supported by an increased use of the digital ecosystem rather than paper.
- ▶ Students should have the opportunity to demonstrate learning using digital technology.
- ▶ The use of digital resources and global learning opportunities should be supported.
- ▶ Students should be able to pursue a personalized and flexible path of learning and document the experiences in a portfolio that follows them throughout their educational journey;
- ▶ Teachers require confidence and capacity to be able to effectively integrate digital technology into their professional practice;
- ▶ Technology enhances communication with parents/guardians.
- ▶ Student real-time achievement data and attendance information helps parents support children with learning.
- ▶ Teachers have student data readily available for developing and maintaining differentiated instruction, personalized assessments strategies and classroom management;



- ▶ Academic and administrative services should be delivered across a virtualized, dynamic, cost-effective infrastructure;
- ▶ A variety of forms of professional development should be accessible to support staff using technology effectively.
- ▶ The network infrastructure must be accessible, reliable and secure yet still permit easy connectivity and access.

The ultimate goal for the use of digital technology in classrooms is for teachers/students to be able to use any application, any resource, at anytime, anywhere and on any device.

CORE PRIORITIES

- ✚ Develop fiscally responsible operational plans that address hardware refresh, security, systems manageability, power consumption, and emerging technologies.
- ✚ Establish a stable, effective and sustainable infrastructure that meets corporate and academic needs.
- ✚ Ensure that appropriate network and security systems are in place to provide protection of data and personal information from viruses and intrusion attempts.
- ✚ The implementation of a hardware platform for all site-based information technology allowing student and staff wireless access.
- ✚ Integrate new and emerging technology resources and strategies into classrooms and corporate departments to enhance learning, teaching and working experiences.
- ✚ Ensure that systems and processes are in place to support business continuity in response to a service interruption or destructive events.
- ✚ Ensure that core applications and systems are maintained, upgraded, and patched so that they will continue to meet stakeholder needs.

KEY AREAS OF FOCUS

1. Network Infrastructure
2. Data Centre
3. Instructional Technologies
4. Business Continuity
5. Central Services
6. Information and Data Security
7. Professional Development



BREAKDOWN OF KEY AREAS OF FOCUS:

<p>1. Network Infrastructure</p> <ul style="list-style-type: none"> • Switch Technology • Network Traffic Control and Management • Network Performance • Traffic/Packet Shaping • Firewall • Virtual Private Network (VPN) • Wireless Technology 	<p>2. Data Centre</p> <ul style="list-style-type: none"> • IT Optimization Assessment • Server Virtualization Expansion • Physical Servers Refresh Plan • Tivoli Storage Management (TSM) Server Replacement • Electrical Infrastructure Upgrades • Core Switch Replacement • Storage Area Network (SAN) Expansion
<p>3. Instructional/Admin Technologies</p> <ul style="list-style-type: none"> • Computer Refresh (Elementary, Secondary, Continuing Education) • Admin Colour Printer Replacements • Re-tooling the Classroom (e.g., interactive whiteboards) • eLearning/Blended Learning Expansion • Open Access to Internet Resources (e.g., You Tube, social networks) • Software Applications Purchases (e.g., Adobe Creative Suites, AutoCad, SoftPlan) • Printing, Laptop, Desktop Refresh Plan • Emerging Technologies (e.g., mobile devices, touch pads, tablets, Chromebooks) • Gap Analysis and Strategic Planning 	
<p>4. Business Continuity</p> <ul style="list-style-type: none"> • Business Impact Analysis • Disaster Recovery • Backup Procedures • Security • IT Support Management 	<p>5. Central Services</p> <ul style="list-style-type: none"> • BAS-Building Automation System • RAS Plus – Remote Administration System • Document Management • Microsoft Exchange • Microsoft SCM for Systems Orchestration • Maplewood Enterprise Migration • Data Warehouse Enhancement • CEC-DHCP Server Replacement • CEC HW Refresh Plan AND Infrastructure Upgrade • Boardroom Technology Upgrade • Optimization of Databases • Business and Management Applications • Portal Technology • Cloud Computing for systems and endpoints
<p>6. Information and Data Security</p> <ul style="list-style-type: none"> • Security Charter • Security Organizational Structure • Security – Business Alignment • Security Incident Management • Security Risk Management • Culture/Training and Awareness • Security Measurement (security Compliance) 	<p>7. Professional Development</p> <ul style="list-style-type: none"> • IT Coaches • Staff Training



1 | NETWORK INFRASTRUCTURE

Network Infrastructure is required for the flow of telephone and computer data within and between Niagara Catholic sites and out to the rest of the world and back. Below is a brief description chart that provides a metaphor for the infrastructure that likens Niagara Catholic's Network Infrastructure to transportation infrastructure.

Switch Technology	Switches connect and guide and gate network traffic like roadways, highways, road paint, signs, barriers, on and off-ramps and traffic lights guide and gate vehicular traffic.
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Network Traffic	Network traffic is like the people and their various vehicles travelling on roadways. There are many kinds of vehicles, similarly, there are many kinds of network traffic
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Network Performance	The actual and optimal flow speed of traffic which is measured in bandwidth (like the amount of lanes on a roadway) and throughput (like the actual flow rate of traffic which is not always like the posted speed limit).
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Traffic Shaping/Rate Limiting	This technology is like the physical design of roadways and highways and the rules of the highways. This technology can optimize the flow of traffic so that the maximum benefit can be reaped by each investment
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Firewall	A firewall is like police who enforce rules on roadways. A firewall manages telephone and computer data based on rules like the way police govern people based on laws.
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VPN Access	VPN stands for "Virtual Private Networking". This is like Private Security Guards who guard entrances to special places. You can only pass into the special place if the guards know who you are. VPN allows staff and certain vendor partners to enter areas of the Niagara Catholic DSB network based on who you are.
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Wireless Technology	Wireless technology is like Public Transit. Just like public transit may require train rails, above and underground vehicles and fuel to run, wireless internet requires actual wiring, different kinds of rails, and what fuels it is our network and internet service.
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Technology Blueprint 2016-2020

ITEMS	GOALS/RECOMMENDATIONS	2016-2017	2017-2018	2018-2020
Switch Technology	<p>Establish switch refresh program.</p> <p>Continued work with optimizing new technology features (e.g., bandwidth management, wireless technology).</p> <p>10GB interface switch required to meet the increasing traffic demands of combined board devices.</p>	Replacement of 165 8-port managed HP switches. (20,000)	Replacement of 165 8-port managed HP switches. (20,000)	Replacement of 165 8-port managed HP 8-port Switches. (20,000)
Network Performance – Datacenter LAN Increase monitoring and Network Management	<p>Convert from a single vlan to a multiple vlan topology and dedicate laneways to specific types of network traffic to ensure performance.</p> <p>Effectively manage the network.</p>		Implement network shark appliance (\$50,000)	Growing in Urgency Installation of F5 loads balancer (\$30,000)
Traffic/ Packet Shaping AND Rate Limiting Required to control bandwidth abuse.	<p>Implement packet shaper that works with new infrastructure</p> <p>Ensures bandwidth is equitable for all users.</p>	POC AND Installation of Net Equalizer packet shaper (\$16,500)	Implement Rate Limiting Technology w/ NRBN	Implement Rate Limiting Technology w/ NRBN
Firewall Training is required for staff to properly manage our new firewall	<p>Continue to monitor, manage and optimize firewall.</p> <p>Additional investment in PD required.</p>	Staff Training (\$10,000)	IBM K-12 Firewall Audit (\$40,000)	
VPN Access VPN device is antique and requires updating for security purposes. Continuing risk of cyber-attack.	<p>Open VPN access to all staff</p> <p>Greater frequency of maintenance or replacement needed.</p>		Upgrade Juniper VPN or migrate to PA or Cisco (\$60,000)	
Wireless Technology Wireless demands are increasing	<p>Continue Wi-Fi implementation for all site-based information technology allowing student and staff wireless access.</p> <p>Reinvestment in a new wireless management system is required.</p>	Unified Wireless Mgmt WiFi AC Rollout (\$200,000)	Unified Wireless Mgmt WiFi AC Rollout (\$200,000)	WiFi AC Rollout (\$400,000)



2 | DATA CENTRE MULTI-YEAR STRATEGIC PLAN

Data Center Infrastructure is required to provide various Education Technology Services to the school board.

These services include, but are not limited to, the following:

- Student, staff and broader school community data and identity management services
- Student and staff electronic storage, backup and archiving of computer data
- Information and data security services
- Warehousing logistics and procurement equipment, systems and technology.
- Cloud based and physical servers for student and administrative services.
- Telephone service including automatic call distribution and voicemail services
- Networking switches that provide access to the internet and board network.

IT Optimization Assessment	A strategic analysis by a 3 rd party to verify and validate that current operations and planned investments align with best-in-class cost saving opportunities.
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Server Virtualization (Cloud)	Virtualization is the technology that allows many computer systems to run inside a single computer. It is used to maximize hardware investments and squeeze every penny of performance out of school board investments in server technology. Some virtualization will be onsite and some virtualization will be in secure enterprise Canadian cloud data centers.
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Physical Servers	The computers required to run Niagara Catholic District School Board services.
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Data Backup and Archiving	The specialized equipment that a) backs up all the important student, staff and broader school board data and b) archives it to inexpensive storage (magnetic or optical devices) in case of the accidental loss of data.
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Electric Forklift	Required to move large amounts and heavy equipment within our education technology services warehouse.
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Core Switching	Required to provide external services such as internet and telephone service to the school board
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Storage Area Network	Required to provide data storage to students and staff
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Identity Management Platform	Software enabling access to services for students/staff
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Technology Blueprint 2016-2020

ITEMS	GOALS/RECOMMENDATIONS	2016-2017	2017-2018	2018-2020
IT Optimization Assessment for Tactical Improvements	Perform an assessment that includes a detailed IT Report Card on servers, storage, networking, client and security infrastructure. This process is usually facilitated by an external 3 rd party; however the ETO is running an ongoing assessment program instead.	IANDDS Program Phase II Security Remediation Phase II	IANDDS Program Phase III Security Remediation Phase III	IANDDS Program Phase IV +++ Security Remediation Phase IV+++
Server Virtualization NCDSBs strategy involves a combination of onsite and external cloud solutions	Training for the team in virtualization technology	Training for Business IT and DC IT Teams (\$15,000)		
Niagara Community Cloud must go forward	Committed to participate in the Niagara Community Cloud project		Niagara Public Cloud Slice (\$10,000)	Niagara Public Cloud Slice (\$20,000)
Physical Servers	The majority of servers are either HS20 or HS21 models. Average life of our Servers vary between 7 and 8 years of age	(\$70,000)	(\$35,000)	(\$70,000)
TSM-Tivoli Storage Management Server	Ensuring our management platform is performing well.	TSM Storage Expansion (\$30,000) Explore Cloud-Based backup AND archiving Solutions Backup Tapes (\$10,000)	Backup Tapes (\$10,000)	Backup Tapes (\$20,000)



<p>Core Switching</p> <p>This core equipment is required to provide connectivity and access to our new data center location</p>	<p>Required for Data Centre Relocation</p>		<p>(\$50,000)</p>	
<p>Identity Management Automation Tools</p> <p>Needed for complexity of digital IDs</p>	<p>Required to streamline master data operations, management and governance. Mitigate risk and dependence on single point of failure personnel.</p>	<p>(\$40,000)</p>	<p>(\$40,000)</p>	<p>(\$40,000)</p>



3 | INSTRUCTIONAL TECHNOLOGIES MULTI-YEAR STRATEGIC PLAN

Instructional Technologies are required to provide students and teachers with the modern computing technology required for today's connected learning and to better prepare students for their futures. This computing technology includes, but is not limited to, the following:

- ✚ Computing endpoints such as Chromebooks, tablets, desktop/laptop computers,
- ✚ Printers
- ✚ Interactive whiteboards
- ✚ Streamlined websites for learning management
- ✚ Computing data storage
- ✚ Internet and school network access
- ✚ Computer operating systems such as Windows/Mac OS X/Chrome
- ✚ General and specialized software programs and applications
- ✚ Teacher and administrative computer systems
- ✚ Emerging technologies such as modern tablet computers and new high technology
- ✚ Instructional Technology to empower teachers with technology learning resources
- ✚ Strategic supports for Education Technology Services to meet the needs of students while controlling costs.



Technology Blueprint 2016-2020

ITEMS	GOALS/RECOMMENDATIONS	2016-2017	2017-2018	2018-2020
Computer Refresh-Elementary	Establish fixed annual refresh plan	Ongoing lease commitments: (\$900,000)	Ongoing lease commitments: (\$900,000)	Ongoing lease commitments: (\$1,800,000)
Computer Refresh-Secondary/Con Ed	Establish fixed annual refresh plan	Ongoing lease commitments: (\$600,000)	Ongoing lease commitments: (\$600,000)	Ongoing lease commitments: (\$1,200,000)
Admin Colour Printers	Tender multi-year managed print service solution.		(\$65,000)	
E-Learning and Blended Learning Technologies	SA department to establish a multi-year expansion plan Integrate LMS to Google	TBD	TBD	TBD
High school Blade Server Refresh	Blade center refresh for Secondary and Continuing Education.	(\$200,000)		
Open Access to Internet Resources	Develop a holistic strategy for access to internet resources.	BYOD RESTRICTIONS LIFTED		
Operating Systems	Microsoft EES agreement.	(\$300,000)	(\$300,000)	(\$600,000)
Software Applications	Investment in required educational software	(\$100,000)	(\$100,000)	(\$200,000)
Admin Desktops	Develop admin desktop refresh strategy	70 Systems (\$42,000)	70 Systems (\$42,000)	70 Systems (\$84,000)
Admin Lap Tops	Develop admin laptop refresh strategy	TBD	TBD	TBD
Emerging Technologies	Provide support for emerging technologies that support student achievement Thin/Cloud Computing, Robots, Amazon Echo, and Portal technology.	Raspberry Pi for Secondary ComTech Amazon Echo for Elementary (\$25,000)	TBD	TBD
IT Long Term Strategic Planning	Invest 3% of funding into strategic resource outsourcing w/InfoTech/Gartner.	Gartner + Infotech (\$25,000)	Gartner Only (\$25,000)	Gartner + Infotech (\$50,000)



4 BUSINESS CONTINUITY MULTI-YEAR STRATEGIC PLAN

ITEMS	GOALS/RECOMMENDATIONS	2016-2017	2017-2018	2018-2020
Business Impact Analysis	Engage an outside consulting firm Conduct a thorough risk analysis of IT systems	Internal Audit for some req*	Continue w/ internal audit	Continue w/ internal audit
Disaster Recovery	Establish a disaster recovery project that is inclusive to NSC, CEC, and other sites. Work with vendor partners required (Net6, Vaxxine, Kilobytes)	(\$100,000)	(\$50,000)	(\$100,000)
Backup Procedures	Establish backup procedure protocols Develop policies for data retention and archival implementation of a software that would allow for seamless and automated movement of data between tiered storage devices should be investigated (e.g., Symantec Enterprise Vault)	Formalized Data Retention and Archive Framework		



5 | CENTRAL SERVICES MULTI-YEAR STRATEGIC PLAN

ITEMS	GOALS/RECOMMENDATIONS	2016-2017	2017-2018	2018-2020
BAS-Building Automation	Need to evaluate server infrastructure AND lifecycle plan	Johnson Controls Platform Upgrade	TBD	TBD
RAS Plus-Remote Administration	Expansion of web remote administration system for security cameras Recommend reviewing security camera strategy and vendors	TBD	TBD	TBD
Document Management (Comm. Dept.)	The project goal is to implement board policies/guidelines to address Personal Information Management (PIM) through a standard filing system Expansion to 3,000 user licenses required	(\$30,000)	(\$30,000)	(\$60,000)
Microsoft Exchange	Process requiring hardware, consulting/engineering work, anti-virus protection, backup software.			
Network, DC and Core Services Documentation Project	Project "Lazarus" will address the gaps; Project-driven and managed work to close all knowledge gaps in organization.	WIP (No hard cost)		
Telecom Infrastructure	Infrastructure for telecommunications network. Primex modules, upgrades for Toshiba firmware, PA Systems, ACD SW upgrade ACD SW, SIP Trunk Licenses, ACD server replacement, call acct server, Encase Server		(\$150,000)	
Maplewood Enterprise (Student Info. Services Dept.)	Re-evaluate Maplewood strategy and establish lifecycle management plan in place Review licensing Review underlying virtualization strategy	TBD	TBD	TBD
CEC Servers	Review print server and DHCP servers Review Class B IP structure Assess for improvements	TBD	TBD	TBD
CEC Hardware Refresh Plan	Establish a refresh plan for CEC hardware	Refresh of IT Devices (Field S + Apple) (\$30,000)	TBD	TBD



Optimization of Databases	Leverage expertise and compatibility by migrating databases to one platform (Oracle to SQL).	WIP (No Cost Req)		
Business and Management Applications	Regular upgrades to Business applications (IPPS, BAS, Maplewood, School Cash, etc.) Active Directory upgrade	WIP (No Cost Req)	WIP (No Cost Req)	WIP (No Cost Req)
Portal Technology	Establish a portal strategy road map Leverage of Microsoft Sharepoint recommended	TBD	TBD	TBD
Cloud Computing	Research a number of cloud computing options <ul style="list-style-type: none"> ▪ Office 365 and Google ▪ Microsoft Azure for DR 	GAFE AND O365 Implemented		



6 INFORMATION AND DATA SECURITY MULTI-YEAR STRATEGIC PLAN

ITEMS	GOALS/RECOMMENDATIONS	2016-2017	2017-2018	2018-2020
Security Charter	Developed in consultation with Trustees, Director, SAC, and ETS Committees	Targeted for School Year		
Security Organization Structure	Define the security organization structure and map it to a security framework			
Security – Business Alignment	Review security program with each business unit and gather input to improve program	Targeted for School Year		
Security Policies	Define security policies and use a best-in-class security solution framework as the vehicle	In Development	Targeted for School Year	
Security Incident Management	Integrate security incident management into the ETS Helpdesk system	Discussions Underway	Options to be researched (MM)	Targeted for School Year
Security Risk Management	Formally leverage FMEA and XXX quarterly	Discussions Underway	Targeted for School Year	
Culture/Training and Awareness	Leverage a best-in-class automated security awareness platform to combat phishing	(\$50,000)		
Security Measurement (Security Compliance)	Leverage a base tier IT accelerator program to implement a security measurement and compliance framework with full instrumentation	(\$15,000)		



7 | PROFESSIONAL DEVELOPMENT

Ongoing and sustained Professional Development is an integral component to maximize the investment in technology.

Effective Professional Development requires a two-pronged approach:

1. Knowledge of how to use a device.
2. How the device can enable student learning.

Professional Development will provide equity of access to quality digital learning resources in order to transform learning and teaching as identified in *Achieving Excellence: A Renewed Vision for Education in Ontario* to achieve excellence, ensure equity, promote well-being and enhance public confidence and the achievement of the Enabling Strategy to Enhance Technology for Optimal Learning, as prescribed in Vision 2020. Individual and collective capacities are enhanced by professional development.

Staff will be assigned to support school and system level staff to:

- ✚ Gather evidence to assess technology enabled learning and teaching needs facilitating the development of resources to support technology enabled learning and teaching.
- ✚ Facilitating the development, implementation, and sharing of digital resources in Niagara Catholic to support technology enabled learning and teaching.
- ✚ Provide the leadership needed for classroom educators, school and system leaders, and professional learning facilitators to better understand and embrace the enabling role of technology in expanding what, how, when, and where learning takes place.
- ✚ Model how technology enabled learning and teaching supports school and board improvement plans.
- ✚ Participate in the development of the Board Improvement Plan for Student Achievement through the lens of technology enabled learning and teaching.
- ✚ Support and work collaboratively to develop a shared understanding of the value of learning in a virtual environment and how the provincially licensed *Virtual Learning Environment* can enhance the learning of students, educators, and other school board staff.
- ✚ Support virtual learning systems.
- ✚ Support job embedded learning.



Technology Blueprint 2016-2020

ITEMS	GOALS/RECOMMENDATIONS	2016-2017	2017-2018	2018-2020
Investment in Personnel	Technology Enabling the Learning and Teaching (TELT) Contact Digital Coaches	(\$375,000)	(\$375,000)	(\$375,000)

MULTI-YEAR FINANCIAL PLAN 2016-2020

KEY AREAS OF FOCUS	2016-2017	2017-2018	2018-2020
Network Infrastructure	\$246,500	\$370,000	\$450,000
Data Centre	\$165,000	\$145,000	\$150,000
Instructional Technology	\$2,292,000	\$1,967,000	\$3,934,000
Business Continuity	\$100,000	\$50,000	\$100,000
Central Services	\$60,000	\$180,000	\$60,000
Information and Data Security	\$65,000		
Professional Development	\$375,000	\$375,000	\$375,000
ESTIMATED TOTAL COST	\$3,303,500	\$3,087,000	\$5,069,000
BASE FUNDS COMMITTED	\$2,000,000	\$2,000,000	\$4,000,000
ADDITIONAL COMMITMENT TO BLUEPRINT TECHNOLOGY	\$1,303,500	\$1,087,000	\$1,069,000

