



Natick Public Schools

TECHNOLOGY PLAN SCHOOL YEAR 2006 - 2009

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Technology Vision

Going forward, we need to solidify our technology foundation. This means leveraging our existing investments and making sure our technology house is in order. The four corners that comprise this foundation are:

- Staffing
- Infrastructure & Emerging Technologies
- Applications & Classroom Technologies
- Professional Development

In order to move forward, a rebuilding process needs to take place, a process very similar to that of renovating or rebuilding a house. We cannot tear down the structure since it's used daily as the renovation takes place. An assessment conducted before construction begins will allow for careful planning and execution.

As in any project, planning is the key to success. Before constructing the walls or roof of a house, the foundation under ground must be solid to support the structure to place above it.

Staffing

In the case of the Natick Public Schools, the first and most vital corner of our technology foundation is the technology staffing. By far, people are the most important element when it comes to technology. It is the first area on which we need to focus our attention. If people do not have the proper training, the proper skill sets, or are not comfortable or cannot rely on the technology, then we will not succeed.

We rely on people to evaluate, implement, train and use technology, so it is vital we get the right people in the right jobs. We need people who view technology as a tool to get things done and come each day with an open mind to achieving success.

It is important that we have defined roles and responsibilities for all technology positions. This will allow us to recognize staffing gaps and formulate staff development programs. Part of the success of building an effective team is not just defining the right positions and completing the recruitment process but what is done after they are on the job to inspire and develop each member to their fullest potential.

Infrastructure & Emerging Technologies

As the right team is in place, our focus turns to our technology infrastructure. The infrastructure should be flexible and reliable giving us options to grow. Our vision for technology should be an open one, that embraces all forms of technology and we need to be aware of emerging technologies and their future impact. We should not limit ourselves to a single vendor's solution or marry ourselves to a technology, as it would only back us into a corner that we would need to deal with later on.

We need to consider the convergence of voice, video and data. Technologies such as wireless, RFID, biometrics, VOIP and various hand-held devices all offer tremendous possibilities.

Applications & Classroom Technologies

As our infrastructure starts to take shape, we need to assess our applications and verify they are meeting not only our needs today but also our needs down the road. The first group of applications to focus on will be those that allow for improved communications and efficiency, as they will provide us the greatest return both now and in the future. Applications like email, web, student information systems and advanced notification systems to name a few.

As a school district, we should take a serious look at open source and web based software. Open source is software developed by a community of users and freely distributed throughout the world. Many open source products meet if not exceed many of our needs and may help keep our software license costs down. Web based products today offer robust functionality, usually for a modest annual investment, rapid deployment and allow students and teachers the flexibility of using in school or from home. Going forward before making purchase decisions on traditional commercial software packages these options will be considered.

In the classroom, we need to define the tools needed to aide students and teachers to excel with teaching and learning. Technology is both a tool to get things done but also a way to engage and make learning fun. Technologies such as interactive white boards and laptop computers and other wireless devices for students and teachers need further exploration.

Professional Development

The final corner in our foundation is professional development. As we progress on the other three corners, our focus needs to shift toward getting the maximum value from all our investments. That will only occur by offering both our technology staff and faculty the proper amount of training and development opportunities along the way. For each dollar spent on technology we need to invest in training our people how to use it. We also need to keep in mind, training and development is an on-going process, not just when new systems are deployed and implemented. As our plans develop and evolve much more attention and focus will be occur in this area.

As the following plans indicate it will be a rebuilding process. Much of the focus over the next several years will be on building the technology team and infrastructure. This will then lead to more strategic discussions on applications and professional development opportunities but what makes our technology plan unique from most other school districts is our plan begins and ends with people.

2005 – 2006 School Year Results

Completed Initiatives Summer and Fall of 2006:

Technology Staffing:

Please join me in welcoming the newest members of the Technology Team:

- Help Desk Manager - Steve McGrath
- Technician - LaKisha Wilson
- Web & Data Base Administrator - Chris Kiepert
- Network Administrator - Michael Botelho

New On-Line Resources:

<http://www.AtomicLearning.com> will be available for all faculty, staff, students and parents to use. It provides brief on-line tutorials for many of the software packages we use in the district. Login instructions provided once activated this fall.

<http://www.Nettrekker.com> will be available for High School staff use. This package provides faculty with a curriculum based web search engine to assist teachers in preparing digital content for use in the classroom.

<http://www.SurveyMonkey.com> will be available to all administrators. This will allow us to conduct on-line surveys distributed by our email system. Survey results automatically summarized for immediate analysis.

Email System Upgrades:

Our First Class System is now running on a new server with additional redundancy to reduce the risk of downtime due to hardware failure.

The First Class server software upgraded to the newest version and data base repair work completed.

All First Class conferences re-organized to encourage more collaboration within the school district.

A new anti-SPAM filter purchased and installed in late August to minimize receipt of unwanted or inappropriate email messages.

Backend Server Work:

All servers, with the exception of the Library Circulation Servers, are now centralized and located at Natick High School. This has allowed us to consolidate and retire the oldest servers before they fail and cause major problems throughout the district.

All servers upgraded to the newest Operating System version, which should correct login issues in large campus environments such as ours.

New centralized backup and storage devices purchased and installed to aide with protecting data. New faculty added to the new storage device. Existing staff will be migrated to the new storage devices gradually over the 2006 – 2007 school year.

Elementary Software & Network Accounts:

Last year all elementary teachers were surveyed and a focus group formed with representatives from each school. This group worked along with the Assistant Superintendent for Curriculum, Instruction and Assessment and the Director of Technology to discuss issues and possible solutions to improve technology at the elementary level. As a result, the following actions have taken place this summer:

All elementary computers (Approximate 500 machines) within all classrooms and computer labs reconfigured with a standard suite of software. All faculty now have access to Microsoft Office throughout the district.

All elementary faculty and students now have access to Appleworks, Inspiration, Kid Pix, Neighborhood Map Machines, Sammy's Science House and the Internet.

All elementary student accounts now have direct access to the Internet to make it easier for students and teachers to incorporate the Internet into classroom projects and allow students to save their work.

High School Business and Science Departments:

Business Lab A107 cabled and added to the network.

A managed wireless solution being installed as a pilot in the S-wing of the High School. It is being coordinated with the Science Department and activated later in the 2006 - 2007 school year.

Licenses for Microsoft Windows XP and Office 2003 Professional purchased for student use on Windows PCs at the High School.

2005 – 2006 School Year Results

	Objective	Results Achieved	Cost Estimate	Actual Cost
1.	Rebuild Network Servers & Domain Step 1	<p>Production Environment:</p> <ul style="list-style-type: none"> • By end of 2005-2006 school year, 36 MAC OSX and 11 Windows Servers centralized to main computer room at Natick High School. • Currently the only servers located at individual schools are the Library Circulation Systems. • Repurposed (6) existing servers in order to retire (6) of the oldest MAC OSX servers. (30 MAC OSX and 11 Windows Servers). • Additional memory and internal hard drives purchased to sustain existing environment until data migration conducted. • Rebuilt (2) DNS Servers. • All MAC OSX servers upgraded to latest version of MAC OSX (10.4.7) to ease migration process and secure backup of directory information. • Production environment currently consists of (18 MAC OSX and 7 Windows Servers). 	\$75,000	\$105,444
	Step 2	<p>Building of new Storage and Backup Infrastructure:</p> <ul style="list-style-type: none"> • Purchased and installed new storage arrays, backup library and fiber optic switches. • (9) Existing servers repurposed to serve as file servers to storage arrays. Additional servers rebuilt as file servers as we migrate. Each server can manage 100-150 active connections. • Purchased and installed fiber optic cards in all servers for optimum access to storage arrays. • New faculty added to new storage system this school year. 		

	Step 3	<p>Domain Controller Replacement:</p> <ul style="list-style-type: none"> • Purchased (2) additional MAC servers to continue testing without impacting production. • Conducted tests of rebuilding new domain controller from scratch. • Purchased block of on-site consulting time with Apple to verify approach and minimize disruption. 		
	Step 4	<p>Windows and MAC Integration:</p> <ul style="list-style-type: none"> • An Active Directory environment is our long-term goal to achieve seamless integration of MAC and Windows clients. • A second migration will be required to achieve this goal after completion of the above migration. 		
2.	MS Office Compatible Tools	<ul style="list-style-type: none"> • Before this school year, only our Middle School and High School faculty and staff had access to Microsoft Office. • After a detailed review of current Microsoft licenses, confirmed adequate number of licenses to provide all faculty throughout the district access to Microsoft Office on both the MAC and Windows platform. • Completed installation of Microsoft Office on all elementary computers at no additional cost to the district. • Long Term: As we move forward and upgrade elementary machines to MAC OSX, Open Office will be considered as an alternative to MS Office and keep our software costs in check district wide. 	\$33,000	0
3.	High School Business & Science Labs	<ul style="list-style-type: none"> • Cabling conducted in business lab A107. • Cabling for managed wireless access points conducted in S-Wing for Science Department. • Purchased software licenses for MS Office 2003 and Windows XP on student computers. 	\$28,000	\$20,189
4.	Wiring Closets	<ul style="list-style-type: none"> • Project deferred to 2006 - 2007 school year. 	\$46,000	0
5.	Email System	<ul style="list-style-type: none"> • Purchased and implemented ANTI-SPAM filter. • Currently blocking 80% of all inbound email to the district. 	0	\$4,721
6.	Anti-Spyware & Policy Based Content Filtering Solution	<ul style="list-style-type: none"> • Evaluating new device to block spyware and provide a policy based Internet content filter. 	0	\$16,208

Funding Summary		
Beginning Balance in Account	\$10,800	
Funds from Town Meeting Spring 2006	\$182,000	
Total	\$192,800	\$146,562
Balance	\$46,238	

2006 – 2007 School Year

	Objective	Recommended Action	Benefit	Original Estimate	Revised Estimate
1.	Rebuild Network & Domain Controllers (Step 3)	<p>Finalize approach to replace domain controller and migrate user data to new storage device. Conduct replacement and migration over the course of this school year.</p> <p>Will rebuild 8 existing servers (1 for each school) to handle file services for faculty, authentication, DHCP and print services.</p> <p>Only valid user accounts and data will be migrated. Currently over 7,000 accounts to review.</p> <p>Create new Open Directory Domain Controller. Workstations will need to point to both the current and new domain controller during migration.</p> <p>Additional servers and consulting time may be required.</p>	<p>Network performance and reliability significantly improved.</p> <p>Core network services installed on dedicated servers.</p> <p>Centralizing storage and backup will give us a better way of managing and protecting the data on the network.</p>	N/A	\$50,000
2.	Wiring Closet Upgrades and Network Communications	<p>Replace aging equipment at individual schools based on priority.</p> <p>Un-Interruptible Power Supply Units (UPS) will be tested and replaced as needed.</p> <p>Some outside consulting time may be required to optimize IP routing throughout the district.</p>	<p>Multi-year project to replace wiring closet equipment at or near end of life, rotate re-usable equipment to extend its life, increase internal bandwidth for applications and position the district for a centrally managed wireless solution.</p>	\$50,00	\$50,000
3.	Website Development	<p>Purchase and move website to dedicated web server.</p> <p>Build new district level and</p>	<p>Website will no longer share dependencies with our email system.</p>	\$50,000	\$25,000

		<p>school level website on dedicated server.</p> <p>Conduct review of both Commercial and Open Source software tools.</p>	<p>Website will present a more professional image for the school district.</p>		
4.	Student Information System	<p>Evaluate current system against other offerings.</p> <p>Make decision to upgrade or replace current Student Information System.</p>	<p>Detailed student information will be available to faculty, staff, students and parents via an easy to use web interface.</p> <p>Integrate with new district website.</p> <p>Budgeted amount is for full replacement and training.</p>	\$150,000	\$200,000
5.	Equipment Replacement	<p>Workstations Printers AV Equipment</p> <p>Minimum amount budgeted to replace failing equipment</p>	<p>Equipment will be capable of performing all required tasks.</p>	\$100,000	\$50,000
6.	Automated Communication System	<p>Integrate automated communication system with Student Information System contact information.</p>	<p>Will provide the district another way of communicating directly with the public in the event of emergency.</p>	\$20,200	\$25,000
	Total			\$370,200	\$400,000

2007 – 2008 School Year

	Objective	Recommended Action	Benefit	Original Estimate	Revised Estimate
1.	Rebuild Network & Domain Controllers (Step 4)	Design and conduct Active Directory migration. Additional servers and consulting time may be required.	Users will be able to login from any client device (Windows, MAC or Unix) machine and have access to their files.	N/A	\$50,000
2.	Wiring Closet Upgrades and Network Communications	Replace aging equipment at individual schools based on priority. Un-Interruptible Power Supply Units (UPS) will be tested and replaced as needed.	Multi-year project to replace wiring closet equipment at or near end of life, rotate re-usable equipment to extend its life, increase internal bandwidth for applications and position the district for a centrally managed wireless solution.	N/A	\$50,000
3.	Classroom Technologies			\$100,000	\$100,000
4.	Equipment Replacement	Workstations Printers AV Equipment Minimum amount budgeted to replace failing equipment	Equipment will be capable of performing all required tasks.	\$200,000	\$200,000
	Total			\$300,000	\$400,000

2008 – 2009 School Year and Beyond

As our technology foundation is completed and the reality of building a new High School draws closer, we should be looking into technologies that will extend our open technology strategy. Enterprise class wireless and LAN security products that proactively assess a client's security vulnerabilities prior to connecting to the network have both become commonplace in the higher education. Implementation of these technologies within the Natick Public Schools would offer both faculty and students greater flexibility, use of personal computer equipment in a secure fashion and may also offer creative alternatives to funding annual replacement cycles.

For students and teachers, we need to research and find the best options for offering students a blended approach to learning; traditional classroom settings along with an on-line component, much as they will see when they move onto college. Technologies to consider include Moodle, Blackboard, Virtual High School and Mass One to name a few.

For curriculum and administrative effectiveness, selection and implementation of data warehousing technologies and document management systems with workflow capabilities would help replace many of the manual processes and record keeping systems that exist today.

In the classroom, we should be looking into more web-based applications and services as the cost of bandwidth continues to decrease. Collaboration tools such as internet and use of interactive whiteboards that include interactive components for students.

In conclusion, the technology landscape at the Natick Public Schools is full of challenges and potential. Our future is only limited by our creativity and benefits teaching and learning in the classroom.

Appendix A – Technology Audit

AUDIT FORMALLY CONDUCTED DURING SUMMER OF 2005:

Actions taken and status updated as of beginning of 2006 – 2007 school year.

In general, the Natick Public Schools network is experiencing the same challenges found in many companies facing rapid growth. As investments in technology have increased, many of the fundamental building blocks are either missing or not properly implemented to receive the maximum benefit.

In today's world, our expectations for technology are ever increasing and the need to recruit and develop a talented technology staff has never been more important than now. The technology team currently lacks many of the skills and depth necessary to maintain a network of this size and scale.

Most documentation simply does not exist and no formal project management framework is currently in place. As a result, many projects have been undertaken without proper planning and risk assessment. Therefore, there is no way to accurately measure the success or shortcomings of any individual initiatives.

Currently technology deployed throughout the school district utilizes a centralized model, with all key servers and network services are located at Natick High School. Centralization can be a good strategy as long as proper planning and risk assessment conducted. However, with no formal plans developed, initial assessments conducted at the High School identified many issues that have district-wide impact. Only by taking a district-wide approach, will we be able to make long term change and achieve improved results and value cross all schools.

Outlined in the following section is a high-level Technology Audit. It does not comprise a complete list of issues but results of this self-assessment indicate major rebuilding of our network technology and infrastructure will be necessary to achieve our long-term goals and success.

Audit Risks

Risk No	Objective	Status	Effect on Technology Objectives	Recommended Action	Action Taken
1.	Team Organization				
		Complete	Ineffective support of existing network resources and too much reliance on the most highly skilled staff.	<p>Conduct individual skills assessment and develop long-range technology staffing plan.</p> <p>Team approach with a focus on customer service and satisfaction.</p> <p>Establish centralized Help Desk function for entire school district.</p>	<p>Long range staffing plan developed. See Appendix B.</p> <p>Established centralized Help Desk Function.</p> <p>Hired Network Administrators, Help Desk Manager, Web and Data Base Administrator and a Hardware Technician.</p> <p>Support personnel dispatched to each school based on priority and need.</p> <p>Cell phones used to coordinate many of the support personnel in timely manner.</p>
2.	Project Management				
		Complete	<p>No written plans for any technology initiatives (OSX rollout, moving all servers to High School, cabling of Johnson, etc.)</p> <p>No way to know how projects are in relation to time, budget, milestones or risks.</p>	We need to plan first then invest in what makes sense.	<p>All technology projects under regular review.</p> <p>Technology Plan updated annually.</p>
3.	Computer Room Environment				
	Organization	Complete	<p>Equipment, combustibles and junk everywhere.</p> <p>Production and test equipment not clearly identified.</p> <p>Labelling poor or outdated.</p>	Major overhaul of the room is required to determine what equipment is necessary to operate the network in an effective manner.	<p>Transformed computer room at Natick High School into the school district's Network Operations Center operated by the Network Administrators.</p> <p>All equipment rack mounted.</p> <p>Non-essential combustibles and junk removed or relocated to another room.</p> <p>All cables replaced and bundled together in an organized fashion and labelled.</p> <p>Proactive monitoring of network displayed in real time throughout the school day.</p>
	Fire	Pending	No fire-suppression or smoke detectors exist within computer room.	Install dry fire suppression system to protect main computer room for school district.	Facilities aware of issue but not included in the FY07 budget requests.

					The risk of data loss minimized due to improved backup capabilities.
	Electrical	Complete	<p>Electrical supply to computer room shared with other areas of the High School. High School electrical system is currently not adequate during times of high use.</p> <p>No central UPS for computer room. Individual units untested with an unknown life expectancy.</p> <p>No main shut-off to electrical power installed.</p>	<p>Install dedicated electrical panel with adequate power to supply critical devices in main computer room tied into a backup electrical generator.</p> <p>Replace older UPS units and recycle to less critical roles.</p>	<p>Installed and tested new-dedicated electrical panel protected by an electrical generator during summer 2006.</p> <p>Replaced and recycled UPS units.</p>
	HVAC	Pending	<p>Reliance on single ductless AC unit. Two failures have occurred within past two months resulting in temperatures exceeding 100 degrees and failure of several network services.</p>	<p>Add second HVAC unit to minimize single point of failure.</p>	<p>Submitted request for redundant HVAC unit to facilities for FY07 budget.</p>
	Environmental Monitoring	Complete	<p>No monitoring exists so problems could go on for long periods without notification.</p> <p>Leaky roof caused outage and water damage to firewall equipment.</p>	<p>Add monitoring equipment to measure temperature, humidity, power problems, security, smoke and fire.</p>	<p>Temperature and humidity monitoring equipment is now in place.</p> <p>Moved computer equipment within the computer room away from location with known water leaks as much as possible. More work may need to address this issue.</p>
4.	Network Communications				
	IP Routing	In Process	<p>Core switches in place at Natick High School, Wilson Middle School and Ben-Hem Elementary School due to size of the networks in place at these locations.</p> <p>Network cores are single points of failure and only the High School has a current maintenance agreement.</p> <p>Routing of IP traffic does not appear to be working properly. Devices plugged directly into main network core at the High School cannot ping devices at all locations.</p> <p>Both the Wilson Middle</p>	<p>Determine maintenance options for all core switches and have plan in place in event of failure.</p> <p>Clearly define IP routing at the main core and to all locations.</p> <p>Revisit and simplify IP scheme.</p> <p>Gather more details on core routers at Natick High School, Wilson Middle School and Ben-Hem Elementary School.</p>	<p>Documenting network infrastructure.</p> <p>Focus is on the network core at Natick High School, Wilson Middle School and Ben-Hem Elementary School.</p> <p>Investigated maintenance options and costs for Wilson and Ben-Hem.</p> <p>Significant changes to network routing and equipment replacement scheduled for 2006 – 2007 school year.</p>

			School and Ben-Hem Elementary School appear to have an excessive number of subnets.		
	AppleTalk	Pending	AppleTalk seeders at the High School represent single point of failure.	Determine maintenance options and have plan in place in event of failure.	Investigating options and documenting setup. To eliminate once IP routing complete.
5.	Servers				
	Hardware	Complete	Minimum specifications not established. Most servers do not have monitors and only accessible via remote management, single hard disks, single power supplies, and single network cards.	Establish minimum hardware specifications based on network function with proper redundancies. Install monitor cards and KVMs to manage servers even if network communication issues occur.	Minimum server specifications complete. Monitor cards and KVMs implemented.
	Software	In Process	Servers that provide core network services are co-mingled with user data and applications	Move servers that provide network infrastructure services to dedicated boxes.	All MAC servers upgraded to newest version of OSX during summer 2006. As data migration progresses, servers are being reconfigured and repurposed.
	Storage	In Process	No real strategy exists for organizing where data is stored for students and faculty. This makes account maintenance, backups and capacity planning a much more difficult task.	Investigate and implement centralized storage device. A properly organized storage strategy will allow student and faculty data to be better organized and protected, provide for reliable backups and improve ability to conduct adequate capacity planning activities.	New multi-platform centralized storage device purchased and implemented summer 2006. Data migration to complete throughout the 2006 - 2007 school year. All student accounts migrated during October.
	Backups	In Process	Current backup solution not adequate to conduct unattended backups. Incrementally backups done in the past but tapes have never sent off-site. Relied on a single tape appended to each night for an entire school year. A computer room fire or a simple media failure could jeopardize losing an entire year's worth of data. No backups scheduled to run since end of school year.	Identify all data storage devices. Research autoloader tape units with dual drives. Continue attempts to conduct full backups of the network. So far, all attempts have been unsuccessful. Establish daily, weekly and monthly backup procedures that include an off-site media rotation and long-term archival process.	New backup autoloader purchased and implemented summer 2006. Backups conducted daily and new rotation implemented.
	Software Configuration	In Process	Mis-configuration of the security system has contributed to a large number of permissions issues to both individual accounts and groups. Apple and Windows clients currently communicate in separate domains.	Rebuilding all servers and the entire domain will be required to correct these issues in the long term. With a single domain established correctly, with the proper permissions, windows and apple clients will be able to work seamlessly together.	Created a Windows Active Directory Domain in a test environment. Both MAC and Windows clients binding to it. Further testing is on going as we develop our migration plan.

			Making sharing of files not possible among platforms.		
6.	Perimeter Security Measures				
		Complete	<p>Current security measures are weak at best. High risk of unauthorized access or interruptions to network services.</p> <p>A number of servers have external IP addresses on the private side of our network and are port forwarding through our firewall. This allows unnecessary traffic through to the core of our network and subjecting it to attack from the internet.</p> <p>Current firewall appliance is an all-in-one product that is not very effective. Product is immature and not properly configured.</p>	<p>Eliminate port forwarding for all unnecessary services immediately to minimize risk.</p> <p>Establish a DMZ to isolate unnecessary external traffic from the core of our network.</p> <p>Investigate viability of current firewall solution or seek out a more robust firewall solution to safe guard our network.</p>	<p>Changed all administrative passwords.</p> <p>Locked down external access to core router.</p> <p>Port forwarding turned off for all unnecessary services.</p> <p>Due diligence was conducted on existing Joebox firewall. We determined the product lacked basic functionality and technical support found in other industry standards solutions.</p> <p>New firewall selected and implemented due to it feature-set, technical support and attractive price-point.</p>
7.	Cabling				
	Patch Cables	Complete	A large number of patch cables used throughout the district are voice grade cables contributing to network slow downs.	Replace all known voice grade patch cables.	Verified and replaced patch cables at all schools. Visited all devices and conducted a physical inventory at the same time.
	Daisy Chaining	Complete	Daisy chaining of hubs and switches found in classrooms, wiring closets and main computer room at High School. This contributes to excessive network latency (network slow downs) and dropped connections.	<p>Eliminate the use of hubs.</p> <p>Switches should be the exception in the classroom and not the rule.</p> <p>Going forward, daisy chaining of devices should never be acceptable in computer lab environments. As labs are re-done, install an adequate number of cables to support number of computer devices.</p> <p>Daisy chaining within the computer room is never acceptable. This will be corrected ASAP. Servers on a hub and taking a big performance hit.</p>	<p>Eliminating hubs as found.</p> <p>Re-cabled computer lab A109 in the High School properly summer 2005 to support the number of devices.</p> <p>Dismantled and re-cabled computer room during the three October holidays early in the 2005 – 2006 school year.</p>
	Exposed Cables	Complete	Exposed cables in classrooms and unsecured wiring locations at risk to tampering or modification.	Exposed data cables within reach in classrooms need to inside electrical conduit or wire-mold to protect from damage.	Installed new data cabling at Johnson Elementary school Summer 2005 within protective conduit.
	Wiring Locations	In Process	Within most wiring closets ventilation is poor, temperature was warm to hot and	Secure all wiring locations. Build steel cages around wiring in open areas to secure equipment and not create ventilation issues.	<p>Conducted audit of all wiring locations.</p> <p>Collected keys to most, but not all wiring locations. We remain too lax in</p>

			<p>warm to hot and unmonitored, shared storage with non-essential equipment intruding within 3ft of equipment, signs of dirty and dusty conditions present.</p> <p>Removed power cords from two servers at Ben-Hem during the school day caused unnecessary downtime. The source of the problem remains unsolved.</p>	<p>create ventilation issues.</p> <p>Restrict access to all wiring closets and remove non-essential material from area.</p> <p>Environmental monitoring devices should be installed within all wiring closets and temperature and ventilation improvements considered.</p> <p>Clean on a regularly scheduled basis all equipment in wiring closets and main computer room to avoid pre-mature damage or failure.</p>	<p>wiring locations. We remain too lax in securing these locations and it continues to present an unnecessary high risk of downtime.</p>
8.	Workstation and Classroom Technologies				
	District Wide	In Process	<p>Approximately 1500 computers exist in the district.</p> <p>Mostly MAC workstations.</p> <p>Windows machines in school front offices and in a limited number of classrooms at the High School.</p>	<p>Assess and determine need before making platform decisions.</p>	<p>Manual inventory conducted district wide and under review.</p>
	High School	In Process	<p>Most classrooms have only one computer for teacher access.</p> <p>Dedicated computer labs and the library are available for student access.</p> <p>One mobile cart available but not used very often.</p> <p>MAC workstations: Newer and more up to date computers running MAC OSX.</p> <p>Windows workstations: Older machines mostly acquired through donations and refurbished by A+ students.</p>	<p>Assess technology needs and use in the classroom and set district wide standards at all levels.</p> <p>At High School level need to determine platform based on need and increase student exposure to environments found in higher education and the work place.</p> <p>Explore mobile lab concept why it is failing.</p> <p>Explore other classroom technologies such as interactive white boards, web based applications, uses of internet2 and rich media.</p>	
	Middle Schools	In Process	<p>Major differences between two Middle Schools:</p> <p>Kennedy: Most classrooms have only one computer for both teachers and students.</p> <p>One computer lab and library available for student access.</p> <p>No mobile carts.</p>	<p>Assess technology needs and use in the classroom and set district wide standards at all levels.</p> <p>Find strategies to equalize technology investment across both middle schools.</p> <p>Explore mobile lab concept why it is failing.</p> <p>Explore other classroom technologies such as interactive white boards, web based applications, uses of internet2 and rich media.</p>	

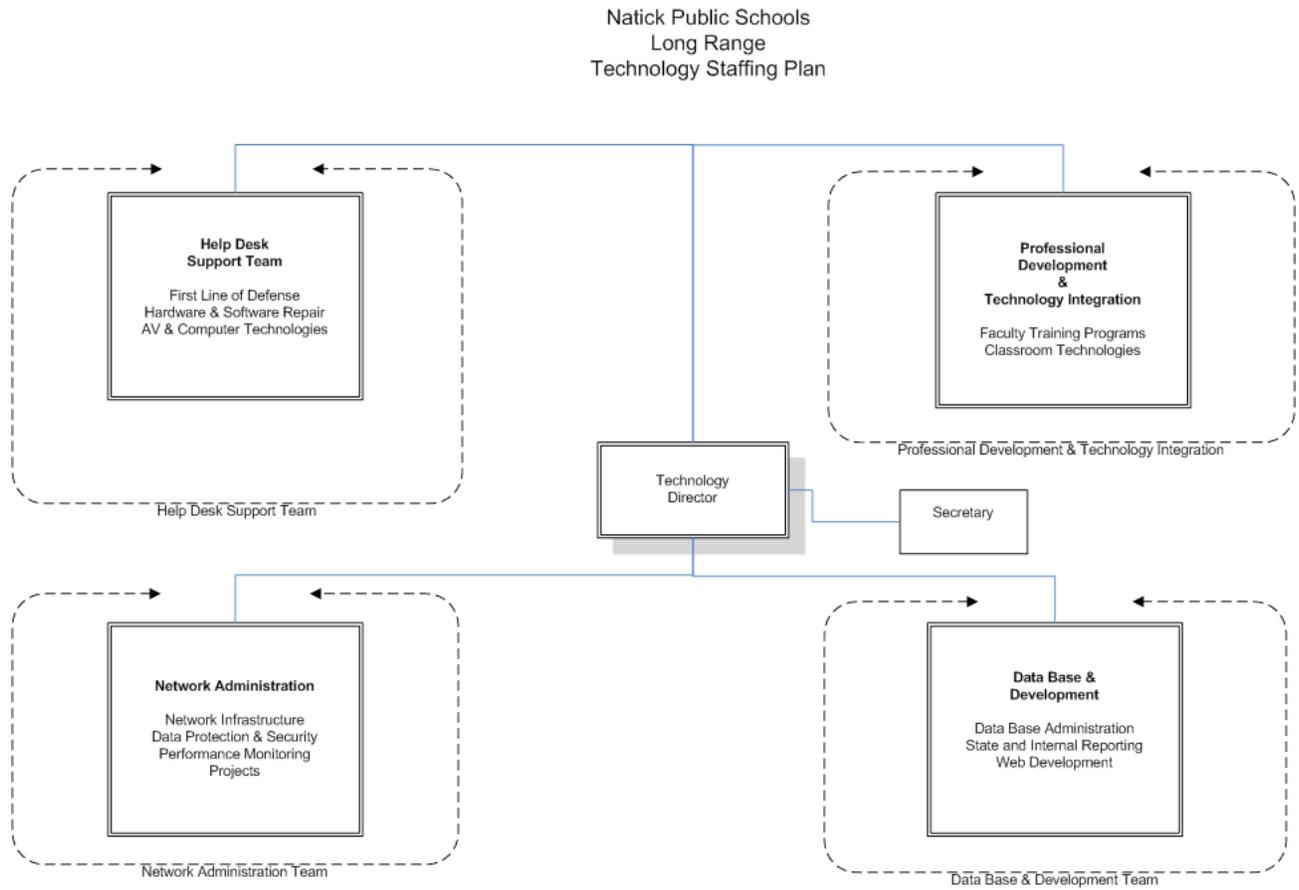
			<p>MAC workstations: Newer and more up to date computers running MAC OSX.</p> <p>Wilson: Most classrooms have one computer available for teacher access and three computers available for student access.</p> <p>Two computer labs and library available for student access.</p> <p>Two mobile carts available but not used very often.</p> <p>MAC workstations: Newer and more up to date computers running MAC OSX.</p>		
	<p>Elementary Schools</p>	<p>In Process</p>	<p>Classroom technology varies greatly by school. Some elementary schools only have one computer in the classroom while others may have three to four computers for both teacher and student use.</p> <p>Unclear how much student use the computers get in the classroom.</p> <p>Some elementary schools have a dedicated computer lab for student access.</p> <p>No mobile labs.</p> <p>Oldest machines in the district. Majority running MAC OS 9 and some running MAC OS 8.</p> <p>Most applications not compatible with MAC OSX.</p> <p>Failing machines are a daily occurrence. Requiring time to troubleshoot and not worth putting any money into repair. As a result, student to computer ratio is suffering due to attrition.</p>	<p>Assess technology needs and use in the classroom and set district wide standards at all levels.</p> <p>Find strategies to equalize technology investment across all elementary schools.</p> <p>Explore other classroom technologies such as interactive white boards, web based applications, uses of internet2 and rich media.</p> <p>Determine strategy replacing aging equipment and upgrading to OSX and upgrading older applications.</p>	<p>All elementary computers (Approximate 500 machines) within all classrooms and computer labs reconfigured with a standard suite of software. All faculty now have access to Microsoft Office throughout the district.</p> <p>All elementary faculty and students now have access to Appleworks, Inspiration, Kid Pix, Neighborhood Map Machines, Sammy's Science House and the Internet.</p> <p>All elementary student accounts now have direct access to the Internet to make it easier for students and teachers to incorporate the Internet into classroom projects and allow students to save their work.</p>

9.	Wireless				
		Pending	Wireless access through low cost access point deployed throughout school district.	Need an enterprise wise strategy to effectively deploy wireless and protect against unauthorized access.	Until we have a stable wired infrastructure all action with wireless deployments are on-hold.
10.	Anti-Virus Protection				
		In Process	<p>Anti-virus solutions not effective.</p> <p>Joebox firewall has modest anti-virus services.</p> <p>First Class also has some basic anti-virus protection.</p> <p>Only a few Windows Servers and a few MAC clients had any anti-virus software.</p>	<p>Need to take a layered approach:</p> <p>Firewall Email Server Servers Workstations</p> <p>Adequate anti-virus protection needs to be in place, up to date and scanned on all the above layers on regular basis.</p>	<p>Discovered we own copies of both Symantec Anti-Virus and Computer Associates Etrust.</p> <p>Researching which product or products will work best and cost to implement.</p> <p>Symantec Anti-Virus (Centrally Managed) currently on all windows servers and a group of windows clients at Natick High School.</p> <p>Etrust running on a few MAC clients.</p>
11.	Anti-Spam Protection				
		Complete	<p>Anti-Spam protection provided by FirstClass and JoeBox is inadequate.</p> <p>Spam is a daily frustration for many.</p>	Evaluate solution against industry standards.	Implemented new Anti-SPAM filter Summer of 2006.
12.	FirstClass Server				
	Reliability	Complete	<p>First Class Server fails daily.</p> <p>Users have reported data loss.</p>	A more detailed audit of the First Class Server is required.	<p>Conducted audit with outside company and confirmed our concerns.</p> <p>Many of the configuration and permission settings improperly configured and applied.</p> <p>Developing a detailed plan to correct and minimize any potential downtime.</p> <p>Installed script to check First Class is running all the time. If not, it restarts the necessary services.</p> <p>Automating backup routine with new backup device.</p>
	Organization	In Process	<p>Currently Email and Website reside on same server.</p> <p>All website data is public information.</p> <p>Need exists for internal intranet for school district.</p>	<p>Email and Website should run on separate servers. Investigate if First Class can handle this requirement or if another product needed.</p> <p>Need to establish website for external use – face to the public and an internal site – Intranet for internal school district use.</p>	Moving public website off First Class to dedicated box. Separating web and email hosting to minimize risk and take website to next level.

13.	Citrix Servers				
		Complete	<p>Citrix servers deployed to allow PC applications to run on MAC systems.</p> <p>OS drive running out of disk space. Server will not run until corrective action taken.</p> <p>Servers riddled with virus activity.</p> <p>Servers failed daily, negatively impacting:</p> <p>1.) Natick High School to teach some Business and Science classes.</p> <p>2.) Nurses unable to access (SNAP) student medical records.</p> <p>3.) Facilities unable to control heating systems to several schools.</p>	<p>Explore the need Citrix is addressing. Other approaches exist to manage Windows applications that may be more effective.</p> <p>Need to remove user data from C drive to create more space.</p> <p>Scan and clean server viruses.</p>	<p>Conducted extensive internal and external review of all Citrix servers and how we utilize the technology.</p> <p>It was determined the Citrix servers would need to be totally rebuilt if we wish to continue there use.</p> <p>Configuration and permission settings improperly configured and applied.</p> <p>To minimize the impact Citrix is having on our environment in the short term we have locally installed the necessary student applications needed to conduct classes.</p> <p>It is unknown at this point if Citrix is required in this environment as all application s are now available through other means.</p> <p>No further action until the need is determined.</p>
14.	Software Distribution				
		In Process	Many undocumented tools (Netboot, Filewave, Keyserver, etc.) and procedures exist that will be useful going forward.	Develop software distribution strategy for both Windows and MAC clients.	Testing of Netboot and Filewave have been conducted:
	Netboot	Complete	Netboot's current configuration and use to boot local workstations contributes to slow login times at Wilson and Ben-Hem.	<p>Evaluate the benefits of using Netboot to boot off a server image and the amount of network overhead generated.</p> <p>A better approach may be to use Netboot to deploy new images but still allow machines to boot locally.</p>	Conducted speed tests within both computer labs at the Wilson Middle School. Greatly enhanced boot and login time when machines were pointed to boot locally and re-imaged.
	Filewave	In Process	Used to push software packages to clients not in the standard Natick Public School image.	Need to explore solutions to deploy software across both MAC and Windows platforms.	Rebuilding the server with Filewave tech support team then will further explore distribution to Windows clients.
15.	Patch Management				
		Pending	Patch management tool is currently not in place to guard against OS vulnerabilities or bugs.	<p>Review and implement automated solutions for both Windows and MAC platforms.</p> <p>Evaluate MAC OSX.4 capabilities and Microsoft's Windows Update Services Server.</p>	
16.	Telecommunications				

	Voice	Pending	<p>NEC PBX installed locally within each school building managed by the town IT staff.</p> <p>Not all classrooms have telephones installed.</p>	<p>Develop plan to deploy phones to all classrooms.</p> <p>Should investigate VOIP possibilities.</p>	
	Data	In Process	<p>District relies on a single 5MB internet pipe provide by MecNet directly to Natick High School. RCN is the local loop providing us connectivity back to MECNet's backbone in Marlborough Mass. MecNet uses multiple ISPs to provide schools commercial internet access.</p>	<p>Review current bandwidth needs and utilization.</p> <p>Investigate options for increased bandwidth.</p> <p>Consider adding secondary service provider to balance traffic or provide failover capabilities.</p>	<p>Investigating options for high speed internet directly with tier one providers.</p>

Appendix B – Technology Staffing Plan



Natick Public Schools Long Range Technology Staffing Plan

