



Natick Public Schools

TECHNOLOGY PLAN

SCHOOL YEAR

2007 - 2010

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DIRECTOR OF TECHNOLOGY

NATICK PUBLIC SCHOOLS

Creation Date: 10/15/07

Last Updated: 2/08/08

Version: 1.4

Document Control

Change Record

Date	Author	Version	Change Reference
10/15/07	Dennis Roche	1	First Draft
12/11/07	Dennis Roche	1.1	Distributed to Reviewers
12/17/07	Dennis Roche	1.2	Distributed to School Committee & Principals
12/28/07	Dennis Roche	1.3	Minor revisions
02/08/08	Dennis Roche	1.4	Updated Summary of 2006 – 2007 Results

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Contents

Document Control	2
Change Record	2
Reviewers	2
Distribution	2
Contents	3
Technology Vision	4
Technology Planning Framework	6
2006 – 2007 School Year Improvements	8
Summary of 2006 – 2007 Results	10
Current Environment and Challenges	12
Next Steps	15
Plan for 2007 – 2008 School Year	17
Plan for 2008 – 2009 School Year	19
Plan for 2009 – 2010 School Year and Beyond	21
Appendix A – Technology Audit	22
Appendix B – Technology Staffing Plan	33

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 of this foundation are:

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

In order to progress forward and realize this vision, 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 is 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 must be solid to support the structure 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

Once 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. 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 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.

Technology Planning Framework

Since July of 2005, the Natick Public School has been using the following framework for Technology Planning. It is an iterative process and we have invested the past 2 years on steps 1 - 3. The framework has been extremely helpful in guiding and gauging our progress:

Technology Planning Framework

1. Assessment
2. Team Building
3. Invest in the Back End Solutions
4. Invest in the Front End Solutions
5. Invest in Training and Support
6. Collaborate on new Technologies and Expectations

Assessment

Technology Director conducted an initial assessment and created a Technology Audit. The results of this audit are updated annually and are included as Appendix A of this year's plan. The audit covers a variety of broad issues and potential risks that existed back in July of 2005 and identifies risks that still exist today. It documents recommendations made, action taken and results achieved. It is this initial audit that still guides much of our Technology Planning today as it encompasses years of effort that are needed to make technology what we all expect it to be within the Natick Public Schools.

Team Building

In order to address concerns discovered in the audit, and ensure the proper resources are in place to manage the technology environment in both the short and long term, a technology staffing plan was defined and is included as Appendix B in this year's plan. A process of restructuring and recruiting followed and we now have a team of talented individuals in place, ready, willing and able to continue moving our technology efforts forward.

Invest in the Back End Solutions

Before we can address the needs of students and teachers directly in the classroom regarding technology we need to have a solid foundation to build on. As many of the audit concerns indicate, this is a major undertaking and the most significant pieces of work have now been completed. Remaining upgrades identified in the audit for our backend systems are scheduled in the plan for this year.

Invest in the Front End Solutions

Investing in the front end is simply investing in the teachers and the students. It means investing in the classroom, in the things we all see and touch. It is the most visible area of our technology environment and it is the most wide spread. The front end encompasses all the computers and software used by students, faculty and administrators. It includes all the physical devices we see such as printers, scanners, digital and video cameras, projectors and also the more progressive technology we have been piloting such as interactive white boards.

Since these front end technologies include so many touch points, it is also the most expensive and dynamic. It will require a significant amount of planning,

funding and a review of all technology resources. It will require collaboration with students, parents, teachers, administrators and members of the community. It will require an expansion of the technology planning process that doesn't exist today so that all these groups have a voice toward the future direction of technology.

Invest in Training and Support

As the building blocks are put into place, the faculty and staff need to be given frequent opportunities to master their technology skills so that they can effectively use them in the classroom. The faculty need to feel confident that the district will fully support technology before we will see its use expanded into the curriculum. As our long term technology staffing plan indicates (Appendix B), resources should be allocated to this function so that it becomes a standard practice within the Natick Public Schools.

Collaborate on new Technologies and Expectations

As we meet objectives previously identified, our needs and expectations as a community will continue to rise. On a regular basis, we need to look beyond our daily activities and seek out what are the next round of challenges we need to face. As we do this, the framework begins a repetitive process as we need to re-assess where we are, identify we have the proper staff to get to the job done, make back end adjustments as we consider and implement new front end technologies, ensure people have the opportunity and training to master the technology and then look outside the box for the next wave of expectations.

2006 – 2007 School Year Improvements

Completed Initiatives Summer and Fall of 2007:

Introducing our new Student Information System - IPass

Our new IPass Student Information System has been installed and data converted from our former Starbase System this past summer. It is a web based application and can be accessed by faculty and staff from the school network or from home via the internet.

Introducing ConnectED

The ConnectED school messaging system has also been implemented and is being integrated into the IPass system during the 2007 - 2008 school year. ConnectEd gives administrators the ability to send out automated phone and email messages to parents.

Introducing New School Websites

Significant progress has been made developing new school level websites across the district, Phase II of our web project. Each school principal will decide who will participate and represent your school and when your new school website is ready to go live.

As we progress through Phase II of this project, the Technology Team is providing training and technical support as needed to assist each school in getting a new site implemented this year. As each site is built, the content is maintained locally by each school and does not require technical skills greater than updating your average word processing document.

As with the IPass system, individuals updating the websites do not require any special software to be installed. All that is needed is an internet connection and a compatible web browser.

When Phase II of the web project is complete, all schools having a new website, we will begin work on Phase III and work with teachers across the district to establish standards for teacher web pages.

Network Infrastructure Improvements

The most significant network improvements to date were made just before the end of school last June and during this past summer. These improvements further enhance the performance, reliability and scalability of all technology services. Below is a brief list of these enhancements:

District Wide Infrastructure Improvements

Internet Bandwidth and Internet Service Provider (ISP)

Natick Public Schools participated in the E-Rate process in Fall of 2006 to acquire more internet bandwidth and potentially a new internet service provider (ISP) for the start of the 2007 - 2008 school year. In this process qualified vendors participated in an open bid process. RCN was awarded the bid not only based on price but also on the fact that it offers the Natick Public Schools the quality of service we expect from an ISP. The transition to RCN was completed in June of 2007 and our bandwidth went from 5MB to 20MB that is shared among all schools via our fiber optic network.

Migration from Open Directory to Active Directory

This past summer our Technology Team had a dilemma to solve. Our network servers were failing, requiring a rebuild or risk loosing it all. Rather than repeat the past and just rebuild what was in place then migrate to Active Directory only a year later didn't make a lot of sense. So we went for it all and we did it!

We migrated from Open Directory to Active Directory not to just do it but to support the open strategy we believe in. We want to offer students and teachers the best solutions down the road and this was one more major hurdle to overcome. This required not only every server (approximately 50) be rebuilt but every workstation (approximately 1,500) that ran on the network. This project took the resources of the entire team and we should be proud of what has been accomplished because it now gives us options and allows us to accelerate our plans to getting newer technology into all of our schools. The next hurdle we'll need to tackle is how to fund it and some strategies for doing so are further outlined in our plan.

Elementary School Changes:

All workstations reconfigured and ICAB browser added so Atomic Learning can be used.

Middle School Changes:

All workstations reconfigured and Firefox browser added for IPass and new Website project.

Additional memory was added (512MB) to approximately 150 computers in labs and libraries to better handle multi-media applications.

High School Changes:

All workstations reconfigured and Firefox browser added for IPass and new Website project.

Re-cabled areas in NorthStar area of the building to improve performance and reliability.

Deployed new lab of 20 HP Windows computers to room A111 that was donated from a High School student who won a contest entered into last year.

Summary of 2006 – 2007 Results

	Objective	Results Achieved	Cost Estimate	Actual Cost
1.	Website Development	<p>Minimize dependencies between web and email systems.</p> <p>Website will present a more professional image for the school district and offer more informative and timely information for the public.</p> <p>Each department within the school district will be able to provide their own content to the public and be responsible for keeping their content current and up to date.</p>	\$25,000	\$26,861
2.	Student Information System	<p>Search Committee selected and helped implement IPass Student Information System created by IMG based in Framingham Massachusetts.</p> <p>System is web based and provides detailed student information available to faculty and staff from school network or from home.</p> <p>Parents and students will be provided access down the road once teachers implement more of the products' functionality.</p>	\$200,000	\$159,008
3.	Automated Communication System	<p>Search Committee chose ConnectEd as the school district's automated communication system.</p> <p>Will provide the district another way of communicating directly with parents and members of the public. Can be used for community outreach and also in emergency situations.</p>	\$25,000	\$17,640
4.	Various Network Upgrades (Complete Rebuild of Network Servers)	<p>Network performance and reliability significantly improved.</p> <p>Core network services installed on dedicated servers.</p> <p>Centralized storage and backup will give us a better way of managing and protecting the data on the network.</p> <p>Users will be able to login from any client device (Windows, MAC or Unix) machine and have access to their files.</p> <p>We achieved this goal in 1 year rather than the 2 years originally estimated.</p>	\$150,000	\$210,343
5.	Memory for Middle School Computers	Memory added to 150 computers at both Middle Schools to enable them to run multi-media applications more	N/A	\$9,986

		reliably.		
6.	Cabling	Cable repairs needed throughout district	N/A	\$8,039
7.	Refunded to Town		N/A	\$10,857
	Funding Summary			
	Balance from 2006 - 2007 School Year Plan		\$46,238	
	Funds from Town Meeting Fall 2006		\$400,000	
	Total		\$446,238	\$442,734
	Balance		\$3,504	

Current Environment and Challenges

Our Technology team, which is comprised of eight people, manages the technology needs of the entire school district. It serves approximately 700 faculty and staff and 4500 students that share approximately 1500 computers and hundreds of printers and numerous other computing devices located within 9 buildings; one high school, two middle schools, five elementary schools and central office staff within the Town Hall.

All school and town buildings are interconnected by a fiber based network that enables us to provide centrally managed services to all school district employees and students from the High School where the technology team is based. This strategy has allowed us to implement solutions once and provide them throughout the district without having to re-invent the wheel at each school.

Over the last two years, the majority of the Technology team's focus has been to build a solid technology foundation, to provide the most basic of services such as file storage, backup, robust internet access, network security, new school websites and implement a new Student Information System.

This past summer, a major piece of the technology foundation was completed as we migrated from Open Directory to Microsoft Active Directory. This fundamental change was done to allow us to implement our open technology strategy where we can embrace multiple environments such as Windows, Mac, Linux and other operating systems more seamlessly. This gives us an advantage over other school districts that make a decision to choose one over the other as it puts limits on solutions and technology available to both faculty and students. As a technology team we want to seek out the best solutions for students and teachers and be flexible to go in a number of directions as technology continues to change and evolve.

As the majority of our backend work is complete, the Technology team is able to focus much more of its daily priorities on the physical hardware within each school building. At the High School and Middle School levels computers in place run either Microsoft Windows XP or Apple MAC OSX Operating Systems. At the Elementary level it is a combination of Apple MAC OS9 and a few MAC OSX computers.

The challenge we face as a school district is that MAC OS9 is a dead platform. It is no longer supported by Apple and as a result no software vendors are developing any new software for this environment. To address this shortcoming at the elementary level, we have looked more seriously at using web based resources. But the best web resources for elementary schools are more interactive today and require browsers that are current and up to date that support Flash, Active X and Java. None of these exist in the OS9 environment so fewer and fewer websites function on this platform. Even our new websites within the Natick Public Schools do not work on OS9 which will create an issue when elementary faculty are expected to create and update web pages.

But the MAC OS9 issue is a merely a symptom of the much larger problem we face. We need to take a serious look at how we fund school technology. The school district's technology operating budget which manages all technology for all faculty, staff and students within the district is less than \$140,000 per year.

This covers costs for internet access for all schools, hardware and software agreements for critical services and for minor repairs to computers and peripherals. There is no line item in our budget to replace equipment and upgrade software. As a result the technology equipment within the classrooms is failing at an alarming rate and there is no end in sight as to when any of it will be replaced.

In the past, Technology was funded when surplus funds were made available at the end of a school year or when a new school building was constructed or major renovations done. Unfortunately these types of projects don't happen often enough to support the needs of Technology as the average age of computer equipment within the Natick Public Schools is currently 8 years.

Both Town and School officials have met on this very topic and agree that expanding the school department's operating budget to fund school technology not only makes sense but its necessary just to operate. In order to maintain the current size technology environment we have today it is estimated to cost us an additional \$400,000 a year to fund. And it needs to be there each and every year so that we don't fall behind again and get back into the situation we are in today.

The \$400,000 figure was arrived at by setting a goal of replacing 20% of our equipment each year. This includes equipment in the classrooms, wiring closets and main computer room that service the entire school district at Natick High School. Regular annual investments in technology will help us avoid taking big hits in any given year and gives us the opportunity of staying reasonably current.

Once annual funding for replacing equipment is secured, we need to assess the most urgent needs and address those areas first. Currently the number one technology priority is the elimination of any and all unsupported platforms. That means retiring all MAC OS9 equipment and we should start by addressing the needs of our teachers first.

The educational process begins and ends with the teacher and if they don't have the tools to do the job right then the potential technology offer will never be fully realized. Most teachers at the elementary level struggle to perform even the most basic tasks simply because their equipment is not up to the challenge. The machines either suffer from constant hardware failures due to age or the software is riddled with bugs that the software vendors no longer support.

Since MAC OS9 is used exclusively at the elementary school many may think it is merely an elementary issue. But in reality it is an issue impacting technology throughout the district.

It is true OS9 is only used in our elementary schools, on approximately 500 computers. But the level of effort and time expended to support this environment is depriving resources from focusing on making headway on all other technology initiatives. Eliminating OS9 would allow the elementary schools to once again be on a supported platform and would allow us to consider future software upgrades. Currently no new software can be added to the OS9 environment and the world is simply passing us by.

The other impact OS9 is having is on developing the technical skills of our students, faculty and staff. If we continue to use old updated technology the technical skills of our students, faculty and staff will continue to deteriorate and will never challenge those who want to master technology.

To attract the best faculty and staff and engage students, technology needs your support on an annual basis.

Next Steps

To date we have completed the majority of Steps 1 through 3 of the Technology Planning Framework. The remaining items to complete Step 3 (Invest in Back End) are scheduled for this school year as indicated in the plan for 2007 - 2008 school year.

As Step 3 nears completion, the planning for Step 4 (Invest in the Front End) needs to begin. Below are three key areas that should be addressed in this area of the Technology Planning Framework:

1. Expand Technology Planning Process
2. Review Annual Funding for Technology
3. Review of Technology Resources and Use

Expand Technology Planning Process

Technology devices in use throughout all schools are standardized to keep costs in line and streamline support efforts. More feedback is needed on a regular basis to ensure we are not missing opportunities that should be further explored. To do this we need to ensure all stake holders have a voice and provide regular and ongoing feedback on the types of technology devices in use. Below is a breakout of some key stake holders that should be included in this process:

- Students
- Parents
- Faculty
- School Administrators
- Committee Members
- Members of the Natick Community

The methods used to collect feedback could be as simple as survey data that is collected and analyzed or more a formal structure that is obtained through a committee that meets several times throughout the school year.

Review Annual Funding for Technology

Current annual funding for Technology in FY08 is limited to an operating budget of \$139,432 for the entire school district. This is allocated from the School Department's Operating Budget for FY08 which is \$ 40,928,029.

This level of investment in technology pays for internet access for all schools, hardware and software agreements essential to run the network and minor repairs for failing equipment.

There is no funding in our technology budget to replace equipment on an annual basis.

We anticipate for FY09, the need to increase funding of the Technology Department's operating budget to a minimum of \$186,432 to cover the operating costs of projects listed below which have not been addressed due to a level funding mandate:

1. **Annual Maintenance Cost of our SIS System.** Responsibility of hosting and supporting the SIS System was transferred from the town to the school

department this year. In the past the town has paid similar costs associated with its maintenance. We estimate this cost to be \$25,000 annually and funding for this annual maintenance should be requested to be transferred from the town to the school department.

2. **Annual Subscription Cost of ConnectEd System.** This is a new service added this year with funding for the first year was provided by town meeting. To continue its use each and every year funding needs be added to the school department's operating budget. The cost is based on student enrollment and is estimated to be \$17,000 per year.
3. **Expand Use of Eutactics Solution for SPED Staff.** This is a web based service that tracks student IEPs and is anticipated to cost an additional \$5,000 per year to fund.

The School Department's Operating Budget for FY09 is anticipate to be \$42,974,430 if a town over-ride vote is passed but it still does not include any funding to replace technology equipment annually or the three specific operating needs identified above.

In addition to seeking an annual commitment from the town, the School Department should further explore alternatives sources from:

- Local Business
- Grants
- PTOs
- Community Fund Raising Events

Review of Technology Resources and Use

A more detailed review of existing hardware and software should be conducted as some assets are worth further investment while others should be targeted for replacement.

As we progress throughout the school year it is becoming clearer where our areas of need exist and the most urgent is to eliminate all unsupported and outdated technology.

Plan for 2007 – 2008 School Year

	Objective	Recommended Action	Comments	Estimate
1.	Student Information System	<p>Continue working with the vendor IMG and faculty and staff on learning and implementing the system:</p> <p>Implement new student and faculty ids</p> <p>Implement new standardized report cards at High School and Middle School levels</p> <p>Utilize all attendance functionality including ConnectEd integration.</p> <p>Utilize and train faculty on grading module.</p>	<p>Complete</p> <p>Complete</p> <p>In progress</p> <p>Pending</p>	0
2.	ConnectEd	Load with student and faculty data and train administrators on how to use.	<p>District data loaded and available for use.</p> <p>Training scheduled in January.</p>	0
3.	Website Development	<p>Complete Phase II School Websites.</p> <p>Begin Phase III Teacher Websites</p>	<p>In progress: Natick High</p> <p>Following schools completed: Wilson Kennedy Lilja Ben-Hem Johnson Brown Memorial</p> <p>Discussion and planning with teachers will begin after phase II above is complete.</p>	0
4.	Network Projects	<p>Natick High School:</p> <p>1. Migrate users at Natick High off town network to alleviate bottlenecks on town hall and improve performance at Natick High School.</p>	In progress.	0

		<p>2. Re-segment building to improve network performance.</p> <p>Ben-Hem Elementary:</p> <p>1. Re-segment building to improve network performance.</p>	<p>Scheduled for February break.</p> <p>Scheduled for April break.</p>	
5.	Hire a Technology Trainer	Re-classify open Technology position for this new role that was presented in original staffing plan (Appendix B).	<p>Resource dedicated to training the faculty and staff on how to use the technology and integrate into the curriculum.</p> <p>Someone who will learn and teach others how our software applications work.</p> <p>Develop and schedule workshops with teachers and staff throughout the year.</p> <p>Work with teachers one on one in the classroom settings.</p> <p>Re-enforce and remind teachers of all technology resources available to them.</p> <p>Focus on teacher and staff development.</p>	Existing Position
	Total			0

Plan for 2008 – 2009 School Year

	Objective	Recommended Action	Comments	Estimate
1.	Student Information System	Pilot parental access	Parents will be able to access information on their children on-line.	0
2.	Web Development	<ol style="list-style-type: none"> 1. Phase III of Web Project (Teacher Pages) 2. Additional Enhancements to Public Website 3. Intranet Project 	<p>Continue working with teachers on defining and creating teacher web pages.</p> <p>Expand electronic payment capabilities.</p> <p>Investigate opportunities to streamline internal district communications and operations.</p> <p>Eliminate unnecessary paper oriented processes.</p> <p>Stop using email system as a filing cabinet.</p>	0
3.	Email Project	<p>Two Phases:</p> <ol style="list-style-type: none"> 1. Upgrade or replace email system. 2. Implement Archiving Solution. 	<p>Known Risk: Currently out of Compliance with Email Archiving Requirements.</p> <p>Schedule upgrade for summer 2009.</p>	Unknown at this time
4.	Equipment Replacement Plan	<p>Fund Technology Replacement Plan as part of the school department's operating budget.</p> <p>The purpose of these funds is to replace a percentage (20% is the goal) of our oldest hardware and software in the district each year without fail.</p> <p>How Funds would be Invested:</p> <p>Funds will be allocated to addressing the most urgent need throughout the district.</p>	<p>Funding will be dedicated to replacing school technology equipment and be there each year.</p> <p>Majority of equipment will remain supportable and usable while used in the district and hardware failures due to age should be minimized.</p> <p>Most urgent need Today:</p> <ol style="list-style-type: none"> 1. Ensure all teachers have computers available to them that 	\$400,000

		<p>Each year a portion of the replacement funds would be invested in the classrooms, wiring closets and the data center.</p> <p>Implement Equipment Rotation Plan to maximize impact of each dollar invested.</p>	<p>can perform all administrative tasks and identified software for their area of the curriculum.</p> <p>2. Replace oldest switches at Ben-Hem & High School.</p> <p>Rotation Plan will ensure the newer and more demanding technology will be deployed at the High School where it is most needed. Future years passed down to Middle then Elementary level.</p>	
	Total			\$400,000

Plan for 2009 – 2010 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

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.	Conduct individual skills assessment and develop long-range technology staffing plan. Team approach with a focus on customer service and satisfaction. Establish centralized Help Desk function for entire school district.	Long range staffing plan developed. See Appendix B. Established centralized Help Desk Function. Hired Network Administrators, Help Desk Manager, Web and Data Base Administrator and a Hardware Technician. Support personnel dispatched to each school based on priority and need. Cell phones used to coordinate many of the support personnel in timely manner.
2.	Project Management				
		Complete	No written plans for any technology initiatives (OSX rollout, moving all servers to High School, cabling of Johnson, etc.) No way to know how projects are in relation to time, budget, milestones or risks.	We need to plan first then invest in what makes sense.	All technology projects under regular review. Technology Plan updated annually.
3.	Computer Room Environment				
	Organization	Complete	Equipment, combustibles and junk everywhere. Production and test equipment not clearly identified. Labelling poor or outdated.	Major overhaul of the room is required to determine what equipment is necessary to operate the network in an effective manner.	Transformed computer room at Natick High School into the school district's Network Operations Center operated by the Network Administrators. All equipment rack mounted. Non-essential combustibles and junk removed or relocated to another room. All cables replaced and bundled together in an organized fashion and labelled. Proactive monitoring of network

					displayed in real time throughout the school day.
	Fire	Unresolved and Known Risk Disclosed	No fire-suppression or smoke detectors exist within computer room.	Install dry fire suppression system to protect main computer room for school district.	<p>Unresolved Risk: Construction of Data Center within High School not adequate to handle a dry fire suppression system. Cost is prohibitive within existing building. As a result this room is not protected from a fire event.</p> <p>The risk of data loss minimized due to improved backup capabilities and off-site rotation in place.</p>
	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	Complete and Unresolved Risk Disclosed	<p>Reliance on single ductless AC unit. Frequent failures have occurred resulting in temperatures exceeding 100 degrees and failure of several network services.</p>	Add second HVAC unit to minimize single point of failure.	<p>New primary HVAC system installed summer of 2007.</p> <p>Older ductless system left in place to supplement primary unit if temperature exceeds threshold.</p> <p>Unresolved Risk: The only Data Center equipment within the High School not protected by emergency generators are the primary and backup HVAC systems. These were excluded due to funding constraints.</p> <p>As a result, anytime a power outage occurs at the High School it has the ability to cause a district wide computer outage if the outage occurs for an extended period of time or after hours.</p> <p>To minimize risk, a temperature monitor is in place and facilities staff have been instructed to contact key technology staff when power events occur.</p>
	Environmental Monitoring	Complete	<p>No monitoring exists so problems could go on for long periods without notification.</p> <p>Leaky roof caused outage</p>	Add monitoring equipment to measure temperature, humidity, power problems, security, smoke and fire.	<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>

			and water damage to firewall equipment.		
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 School and Ben-Hem Elementary School appear to have an excessive number of subnets.</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> <p>Network upgrades to both Natick High School and Ben-Hem are planned for the 2007 - 2008 school year.</p>
	AppleTalk	Complete	AppleTalk seeders at the High School represent single point of failure.	Determine maintenance options and have plan in place in event of failure.	<p>AppleTalk has been eliminated from both Middle Schools and High School.</p> <p>Will not be able to eliminate from elementary schools until all OS9 machines are retired.</p>
5.	Servers				
	Hardware	Complete	<p>Minimum specifications not established. Most servers do not have monitors and only accessible via remote management, single hard disks, single power supplies, and single</p>	<p>Establish minimum hardware specifications based on network function with proper redundancies.</p> <p>Install monitor cards and KVMs to manage servers even if network communication issues occur.</p>	<p>Minimum server specifications complete.</p> <p>Monitor cards and KVMs implemented.</p>

			network cards.		
	Software	Complete	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 & summer 2007. As data migration progresses, servers are being reconfigured and repurposed.
	Storage	Complete	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 faculty and student accounts now on new storage device to start 2007 – 2008 school year.
	Backups	Complete	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	Complete	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	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. Migration from Open Directory to Active Directory completed over the summer of 2007. All accounts now managed in Active Directory allowing us to more seamlessly integrate Windows and MAC clients.

			domains. 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 its 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	<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>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>

			dropped connections.	Daisy chaining within the computer room is never acceptable. This will be corrected ASAP. Servers on a hub and taking a big performance hit.	
	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	Complete and Unresolved Risk Disclosed	<p>Within most wiring closets ventilation is poor, temperature was 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>Secure all wiring locations. Build steel cages around wiring in open areas to secure equipment and not 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>Conducted audit of all wiring locations.</p> <p>Unresolved Risk: Collected keys to most, but not all 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>	Assess and determine need before making platform decisions.	Manual inventory conducted district wide and under review.
	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>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>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>Explore other classroom technologies such as interactive white boards, web based applications, uses of internet2 and rich media.</p>	
	<p>Middle Schools</p>	<p>In Process</p>	<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>One mobile cart.</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</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>	

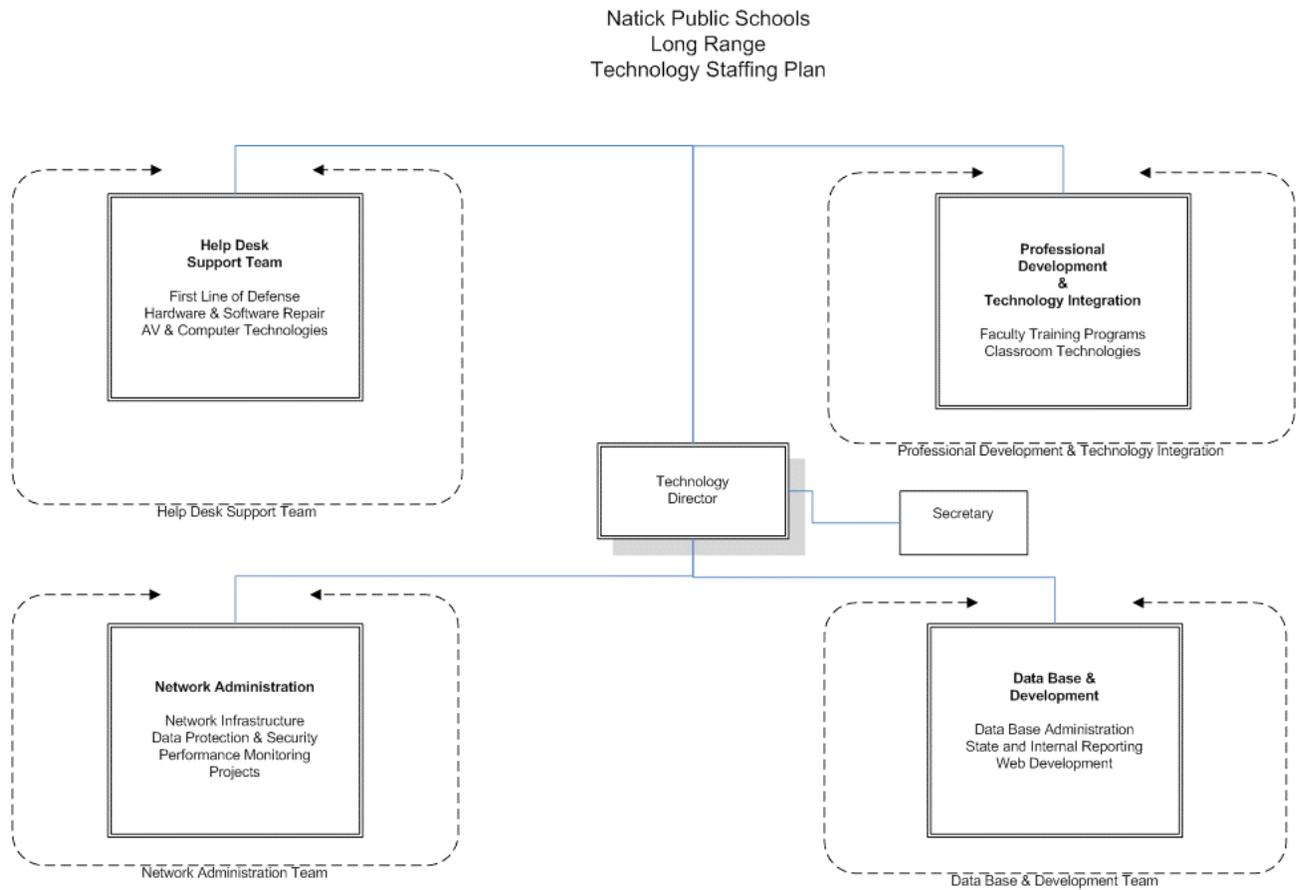
			up to date computers running MAC OSX.		
	Elementary Schools	In Process	<p>Classroom technology varies greatly by school. Some elementary schools only have one computer in the classroom while others may have three to four computers for both teacher and student use.</p> <p>Unclear how much student use 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				
		In Process	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.	Investigating options for wireless technology at Natick High School.
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> <p>Deploying Symantec Anti-Virus solution to all Windows clients during 2007 – 2008 school year.</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>	<p>Moving public website off First Class to dedicated box. Separating web and email hosting to minimize risk and take website to next level.</p> <p>School websites are being removed from First Class during the 2007 – 2008 school as the new sites are built and released.</p> <p>Teacher websites will follow later this school year.</p>
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> <ol style="list-style-type: none"> 1.) Natick High School to teach some Business and Science classes. 2.) Nurses unable to access (SNAP) student medical records. 3.) Facilities unable to control heating systems to several schools. 	<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 their 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 applications are now available through other means.</p> <p>No further action until the need is determined.</p>
14.	Software Distribution				
		In Process	<p>Many undocumented tools (Netboot, Filewave, Keyserver, etc.) and procedures exist that will be useful going forward.</p>	<p>Develop software distribution strategy for both Windows and MAC clients.</p>	<p>Testing of Netboot and Filewave have been conducted:</p>
	Netboot	Complete	<p>Netboot's current configuration and use to boot local workstations contributes to slow login times at Wilson and Ben-Hem.</p>	<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>	<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.</p>
	Filewave	In Process	<p>Used to push software packages to clients not in the standard Natick Public School image.</p>	<p>Need to explore solutions to deploy software across both MAC and Windows platforms.</p>	<p>Will investigate this product further during the 2007 – 2008 school year as we rebuild standard software images for both MAC and Windows clients.</p>

15.	Patch Management				
		In Process	Patch management tool is currently not in place to guard against OS vulnerabilities or bugs.	Review and implement automated solutions for both Windows and MAC platforms. Evaluate MAC OSX.4 capabilities and Microsoft's Windows Update Services Server.	Implemented automatic software updates for MAC clients. Will investigate Windows options as we develop standard software images.
16.	Telecommunications				
	Voice	Pending	NEC PBX installed locally within each school building managed by the town IT staff. Not all classrooms have telephones installed.	Develop plan to deploy phones to all classrooms. Should investigate VOIP possibilities.	
	Data	Complete	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.	Review current bandwidth needs and utilization. Investigate options for increased bandwidth. Consider adding secondary service provider to balance traffic or provide failover capabilities.	Investigating options for high speed internet directly with tier one providers. In Fall of 2006 filed under the E-Rate program to review competitive vendor bids. RCN was awarded the bid and our bandwidth went from 5MB to 20MB. This bandwidth is shared among all our schools and was fully implemented in June of 2007.

Appendix B – Technology Staffing Plan



Natick Public Schools Long Range Technology Staffing Plan

