



Town of Needham

Information Technology Audit

Prepared by: The Office of Municipal & School Technology

EOTSS | Executive Office of Technology Services & Security



Source: Needham Town Hall¹

Introduction

Located in Norfolk County, Massachusetts, the Town of Needham has a population of 28,886 residents and a median household income of \$139,477². The Town was incorporated in 1711 and has experienced numerous changes over its history. In the 1700s, the early settlers relied primarily on agriculture. Extension of the railroads encouraged more settlement in Needham and the Town saw a growth of industrial employment and production during the mid-19th century. Today, Needham is a very active community with several highway exits off of I-95, MBTA access, a vibrant town center, and plenty of public green space. These amenities, along with being just 10 miles west of Boston, make the Town an ideal place to live, work, and play. In an effort to keep town operations secure and running efficiently, Needham entered the Community Compact best practice program on October 13, 2016. They selected Information Technology as their area of focus and received grant funds to perform an Information Technology Audit with a vendor of their choice. This report contains a high-level overview of the Town's IT Audit, including the evaluation of Needham's existing IT structure and staff against their long and short-term IT goals.

¹ Jeff Dell. "Needham Town Hall." *Flickr*. Accessed on July 30, 2018. <https://bit.ly/2M6rGAK>.

² "Community Facts." United States Census. *American FactFinder*. Accessed on July 30, 2018. https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml

Audit Process

In September of 2017, the Town of Needham began work with IntraSystems, Inc. to perform their comprehensive IT Audit. The speed at which technological changes occur impacts the way that business is constructed in both the public and private sectors. In many ways, Needham has done a great job of keeping up with these changes and is better equipped than many other towns. During their audit, IntraSystems reviewed and analyzed the following areas of the Town's IT environment and provided recommendations to remediate any gaps that were found.

CATEGORIZING TOWN-WIDE NEEDS

- *Infrastructure* – Physical Plant, Fiber, Copper, Redundancy, Data Centers, Wireless, Convergence and the future of voice, data and video.
- *Software Applications & Process Improvements* – Financial Systems, Email and Calendaring Systems, Asset Management, Work-Order Processing, Integrated Solutions, Increased Operational Efficiencies, Better Decision Making, Coordinated Resources, Interdepartmental Collaboration, Increased Communication with the Public.
- *Security* – Disaster Recovery, Alarms, Monitoring, Video-Based Security, Policy, Firewalls, Consistent Solutions across Departments.
- *User Support & Training* – Training for IT Staff and End Users, Enhanced User Awareness, Remote Access, BYOD.

NEEDS ANALYSIS/OBSERVATIONS BY DEPARTMENT

Over the course of several days, IntraSystems interviewed fifty individuals from sixteen departments. The interviews included Managers, Assistant Managers, Superintendents, Assistant Superintendents, Administrative and Professional staff. A common thread that was identified during these discussions was the need for new software, hardware, and training opportunities that impact the ability of the individual, or department, to perform their job efficiently and productively.

The following departments were included in the interview process.

DEPARTMENTS INTERVIEWED	
1. Accounting	9. Public Facilities Construction
2. Assessing	10. Public Safety
3. Building Department	11. Public Works
4. Health & Human Services	12. Purchasing
5. Human Resources Department	13. Retirement Department
6. Information Technology Center	14. Tax Collector/Town Treasurer
7. Park & Recreation	15. Town Clerk
8. Planning & Community Development	16. Town Manager

RECOMMENDATIONS

After analyzing Needham’s IT environment and conducting interviews with Town staff, IntraSystems developed a list of infrastructure and department operational recommendations. The recommendations summarized any issues that were found throughout the Audit process, documented the needs and requests of the Town, and offered suggestions for remediation. Some recommendations touched upon IT staffing and training, firewall technology, network and server infrastructure, and software applications.

ASSESSMENT REPORT CARD

To summarize key areas of their assessment with Needham, IntraSystems also included a Health Check report card at the end of the Audit report. The Health Check provided best practice guidelines around specific, yet foundational, areas of IT and graded the Town based on the current state of their environment. The following tables are taken from IntraSystems report. For security reasons, none of the Town’s actual technology specifications are included in these samples.

IntraSystems Health Check Report Card Grades

Health Check Report Card	
Grade	Definition
Needs Attention	We identified specific items of concern and have recommended actions to address them.
Caution	Items of potential concern. The items are either non-critical or require further investigation.
OK	We observed adherence to best practices guidelines. There are no apparent signs of items for concern.
No Data	We were unable to gather data to evaluate.
Not applicable	This item is not applicable

VMWare Best Practice Guidelines

Best Practice Guideline	Impact	Description
Consider enabling Hyper Threading, if applicable	Troubleshooting, Performance	HT can improve processor performance by taking advantage of additional CPU interrupt controllers and registers, thereby enabling slightly higher utilization levels across the virtual infrastructure. A small improvement in performance can be gained, provided applications within the Guest Oses are optimized for HT.
Configure time synchronization using NTP	Troubleshooting	Ensure that each ESXi host is configured to synchronize time with a NTP (Network Time Protocol) server. Synchronizing with NTP keeps the timestamps of the various ESXi monitoring and reporting logs in synch
Maintain Patch and version levels and maintain host driver and firmware versions	Maintenance	Patches for VMware should be maintained and if possible organizations should not fall too far behind in versions. Hardware firmware should be maintained.
Configure Clusters with Adequate resources for maintenance	Maintenance	Clusters should be built with sufficient resources to allow for the evacuation of a host for maintenance

Network Best Practice Guidelines

Best Practice Guideline	Impact	Description
Use separate virtual switches	Performance	Use separate virtual switches, each connected to its own physical network adapter, to avoid contention between the ESXi service console, the VMkernel, iSCSI, and virtual machines, especially virtual machines running heavy networking workloads.
Configure vSwitches with optimal redundancy	Troubleshooting, Management	VMware recommends that there be a minimum of four Gigabit network adapters per ESXi host—two attached to a vSwitch for the management network (service console,

		VMkernel, and VMotion), and two attached to a vSwitch for the VM network to support the virtual machines.
Use vSwitch port groups to segment traffic	Management	By default, vSwitch ports are used to segment out management network traffic, specifically the service console and VMkernel traffic, from general VM traffic.
Physical Switches should be maintained	Maintenance	Firmware on physical switches used to connect the hosts to the storage, to other hosts, to vCenter and to the users should be updated regularly

Storage Best Practice Guidelines

Best Practice Guideline	Impact	Description
Use shared storage for VMs instead of local storage	Management	Store all VM-related files on shared storage so that hosts can be easily interchanged. This way, VMotion and VMware DRS can be used to shift running VMs onto other hosts for scheduled maintenance. Using shared storage also is required to facilitate VMware HA. By placing all workload related items on shared storage instead of local storage, hosts become more uniform in configuration and can be easily and quickly swapped out or recreated.
Configure multipathing to storage properly	Troubleshooting	Multipathing allows an ESXi host to maintain a constant connection between the host and a storage device in case of failure of a host bus adapter (HBA), switch, storage controller, storage processor, or a Fibre Channel/iSCSI network connection. Leveraging this functionality requires at least two HBA cards per host and specific SAN settings.
Maintain firmware version on Storage	Maintenance	Storage firmware versions should be maintained on a regular basis to help with stable storage operation

Security Best Practice Guidelines

Best Practice Guideline	Impact	Description
Limit remote access to hosts by root	Management	By default remote access via ssh using root is disabled for greater security. Create an administrative account to use for remote access and data transfers.

Virtual Machines Best Practice Guidelines

Best Practice Guideline	Impact	Description
Install VMware Tools	Performance	Install VMware Tools in all guests that have supported VMware Tools available. VMware Tools optimize the guests to make them run better inside virtual machines by providing optimized virtual NIC and storage drivers. VMware Tools also provides a balloon

		driver to assist with ESXi memory management. To ensure compatibility and optimal performance, upgrade VMware Tools for older virtual machines to the highest versions supported by their ESXi hosts.
Avoid using screen savers	Performance	Screen savers are often extremely CPU-intensive and can generate unnecessarily high CPU utilization. Disabling screen savers is recommended. Blank, locked screens can be used to achieve security on unattended consoles and these do not create any unnecessary CPU load.

Virtual Center Best Practice Guidelines

Best Practice Guideline	Description
Limit number of managed hosts in vCenter	Large numbers of managed hosts, managed virtual machines, and connected VMware vSphere Clients can affect the performance of a vCenter Server. Exceeding the supported maximums, though it might work, is even more likely to impact vCenter performance.
Run vCenter with sufficient resources	Make sure you are running vCenter Server and the vCenter Server database on hardware with sufficient CPU, memory, and storage resources for your deployment size.
vCenter Location	To minimize the latency of vCenter operations, keep to a minimum the number of network hops between the vCenter Server system and the ESXi hosts.
vCenter Alarms	For the best performance, avoid overly-aggressive vCenter alarm settings. Each time an alarm condition is met the vCenter Server must take appropriate action. If this happens very often, the added load could affect system performance

Conclusion

The Town of Needham put their best foot forward throughout their engagement with IntraSystems, Inc. In doing so, the Town was able to accomplish their original goal to perform an evaluation of their existing IT structure and staffing levels. The results will help them prepare for their long and short-term IT goals. Today, the Town is better equipped with the knowledge necessary to ensure a solid infrastructure is in place. Needham has completed their Community Compact initiative and will continue to incrementally improve the state of their Information Technology.