

Report from Corporate Support Services, Information Technology

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Subject: Information Technology Infrastructure Lifecycle Report

Recommendation

That the Budget Standing Committee approve in principle the formalization of an IT Infrastructure Lifecycle report. The Lifecycle report will analyze and make recommendations on the lifecycle and refresh rate of information technology infrastructure and operating systems deployed throughout the corporation. This endorsement provides the necessary direction for City management to efficiently budget any Infrastructure replacements.

Summary

A Lifecycle report will promote technology evergreening by establishing processes to upgrade technology and computing devices on a scheduled plan.

Definitions:

Lifecycle: The period of time during which information technology hardware and software remains useful to the Corporation.

Refresh rate: The planned rate of replacement for information technology Infrastructure and operating systems.

A detailed Information Technology Infrastructure Lifecycle report provides the guidelines for refreshing the computing equipment throughout the city. The report ensures that the lifecycle and refresh rate of equipment is continuously cost conscious and functionally focused.

Additionally, the Lifecycle report will promote accurate financial forecasting, improve productivity and enhance security. A Lifecycle report can also prevent deployment of unsupported equipment, sub-optimize worker productivity, and prevent budget problems (e.g. when external events create a need for wider change).

CSS-IT will provide Information Technology Infrastructure Lifecycle Reports every three years.

Background

Prior to enforcing scheduled replacements, the CSS-IT division had deployed equipment based on need. Network and server infrastructure, printers and phone equipment had also been replaced based on need. This approach does not provide efficient forecasting for budgetary purposes and leads to inefficiencies generated by downtimes and outdated equipment lacking support. Subsequently, a pilot initiative was introduced to the user's computing equipment which was replaced on a three year life cycle rotation. In 2015 the CSS-IT division introduced a four year life cycle rotation on user equipment, initiating the need for formulating a Lifecycle report for all infrastructure and operating systems in use at the Corporation. It was to provide lifecycle refresh rates for all IT infrastructure including servers, networks and peripheral devices.

The lifecycle replacement of corporate computing equipment is intended to ensure that the staff's primary computing resources are technologically current and powerful enough to allow staff to fulfill their functions in an efficient and effective manner. The procedure ensures that all equipment is covered by a manufacturer's warranty equal to the equipment's lifecycle except in the case of redeployment or repurposing of equipment.

The process will assist in efficient management of funding through accurate reporting and usage of budget allocations with the intention to minimize cost and maximize investment.

Report

The Corporate Support Services - Information Technology division at the City of St. Catharines strives to provide the most optimal, safe and efficient computing environment for the Corporation's employees and elected officials.

The Corporation possesses a multitude of IT infrastructure equipment supporting the day-to-day operations. It is one of the certainties when owning technology that equipment will age and eventually break down. Every component has an inherent lifecycle which helps us determine when it might need to be replaced. With technology evolving so quickly, it is more important than ever to prepare for future changes and put the Corporation in the best possible position to handle equipment end-of-life situations. Therefore by implementing an IT Infrastructure Lifecycle report, the Corporation can avoid problems associated with inoperable or obsolete equipment.

The CSS-IT division will specify a point in time when each individual system should run out of useful life, thereby facilitating a plan to evaluate those systems prior to that cut-off date, analyze what condition the hardware is in and opt to extend the useful life for repurposing and further cost savings.

Desktop Personal Computers and Notebooks:

Industry experts favour a three-year lifecycle for desktop personal computers (PC) and notebooks. Most vendor warranty cycles default to provide a maximum of three years on equipment. Since 2015, the CSS-IT division has implemented a four-year lifecycle for both desktops and notebooks. The CSS-IT division aims to maintain 2/3rd of the user computing equipment under warranty and the remaining 1/3rd supported with in-house staff and repurposed spares. This provides an adequate balance of optimal performance versus support availability for the end user.

There are also corporate users who require the use of specialized technology such as workstations and rugged laptops for their task. These specialized devices are extended to five years for the lifecycle as of 2015.

The most common reason for desktop equipment replacement is to support new applications and programs. In order to perform optimally, many of these applications require equipment with greater memory and faster processors. Additionally another reason for replacement is that equipment at its end of life lacks new parts, security updates, and optimal performance as these are no longer available.

Servers and Network:

The CSS-IT division has an inventory of servers, both virtual and physical. Virtual servers are hosted on infrastructure that consist of enclosures housing server blades. A blade server is a stripped-down server computer with a modular design optimized to minimize the use of physical space and energy. Whereas a standard rack-mount server can function with a minimum of a power source and a network connection, blade servers have many components removed to save space, minimize power consumption and other considerations, while still having all the functional components to be considered a computer. Unlike a rack-mount server, a blade server needs a blade enclosure, which can hold multiple blade servers, providing services such as power, cooling, networking, various interconnects and management. Alternatively, physical servers are primarily rack mounted hardware with the exception of a few tower form factored models that are housed in other locations, dependent on the function.

The industry typically depreciates servers over three years. However, pursuing a server replacement based on a depreciation schedule can cause tremendous churn depending on the number of servers being used by the Corporation. It can lead towards CSS-IT being so consumed with server replacement projects that administrative productivity suffers. To avoid these problems, server refresh in the Corporation has a longer lifecycle.

Most hardware vendors commit to five years of parts availability for servers; therefore, the Corporation purchases by default three-year on-site server support and extend the

support contracts on yearly basis depending on availability. These devices are also protected by UPS devices that are kept under the same warranty period. The CSS-IT division aims for servers to be kept in service at the data centre for a six-year lifecycle. However, due to resource constraints there is the possibility of extending the lifecycle to seven years based on the function of the server in question.

Network infrastructure includes the use of switches, routers, wireless controllers, access points, security appliances and storage hardware. With the advent of the Internet and moving to a global computing environment, networking technology continuously sees advancement and change often. Refresh rates for networking technology is highly dependent on the connection speeds and technologies required for transmission and application use. However, with proper planning and future proofing the lifecycle can be extended further.

Printers

Printing technology in recent years has plateaued due to the online exchange of data, lack of many advancements in the actual process of printing and the push toward being environmentally conscious. However, as with any hardware device there is wear and tear on the equipment and eventual replacement is inevitable. Printing in the Corporation is actively monitored and evaluated to ensure the optimal placement, financial benefit and process efficiency is maintained. Lifecycle replacement on printing devices are generally extended based on reliability and performance of the hardware.

Phone System

The CSS-IT division currently supports an extensive phone system that is made up of many components. The phone system consists of proprietary equipment, server infrastructure, desktop phones and a combination of network switches and devices. Technology advancements have blurred the lines between traditional phone service and Internet/network based communications. The CSS-IT division is currently moving towards implementing new hardware and software to replace end-of-life systems, promote collaboration and provide a better experience for staff and citizens alike. Lifecycle replacement for phone systems are typically based on update of technology and the refresh rate is approximate. As with any hardware device it is inevitable to escape breakdown due to time and use.

Operating Systems

The CSS-IT division has typically maintained and installed Microsoft Windows operating system environments over the last few years. This will continue to be the case as it is the industry standard. With every server and PC purchased, the CSS-IT division typically licenses the newest windows operating system with downgrade rights to the

current standardized platform. It is common practice to hold off upgrading to new releases until after they have been in use in the private sector for a period of time to avoid beta or newly released software problems. This practice allows others within the industry to fully test and vet the software before it is implemented for corporate use. However, at the same time, the CSS-IT division makes every effort to change or upgrade the operating systems before it goes end of life. With end of life, the Corporation risks not being able to acquire needed vendor support and the lack of security patches. This allows the CSS-IT division to plan migrations and have the necessary licenses available when the migration is made. Migrations to new operating systems are never made to beta versions and will only be done after the industry has fully tested the newly released operating systems and all corporate applications have been tested.

Lifecycle replacement requirements

- Exceptions to this procedure require CSS-IT manager approval
- All equipment with a predetermined lifecycle, with the exception of repurposed devices, will be covered by an on-site manufacturer's warranty for the life of the equipment
- Equipment must be replaced according to the lifecycle report, with exceptions to be recognized when there is corporate direction to maintain existing equipment for compatibility or financial constraints.

Infrastructure	Lifecycle for replacement	Notes
User Equipment		
Standard Desktop Computer *	4 Years	
Standard Notebook/Tablet *	4 Years	
IPad Tablet *	4 Years	
Workstation Desktop*	5 Years	Evaluated at 4 years based on performance
Workstation Notebook*	5 Years	Evaluated at 4 years based on performance
Rugged Mobile Notebook/Tablet*	5 Years	Evaluated at 4 years based on performance
Printers	6 Years	Extended based on performance
Server Equipment		
Blade enclosures	6 Years	
Server blades	6 Years	
Physical servers	6 Years	
Storage SAN	7 Years	
Network Equipment		

Core Switches	6 Years	Dependent on EOL
Switches	8 Years	Dependent on EOL
Wireless Controller	6 Years	
Wireless Access Points	6 Years	
Security Appliances	6 Years	Dependent on Technology
Phone Equipment		
PBX equipment (CS1000)	8 Years	Dependent on EOL
Voicemail Server	6 Years	
Ancillary Servers	6 Years	Media, Collaboration, Conferencing etc.
Phones	8 Years	
Operating Systems		
Desktop OS	6 Years	Currently Windows 7 SP1
Server OS	6 Years	Currently Windows 2012 R2 SP1
Browser	3 Years	Internet Explorer 11

Equipment Salvage Process

The industry experts' reports indicate that PCs currently being deployed are sufficient for mainstream users for four years. However, as equipment age they can be transferred to environments needing less computer capability. Current CSS-IT practice is that as new equipment is implemented, the older equipment is redeployed to other uses or placed in hold for spares.

Equipment that is not viable for use in the Corporation is placed on auction for sale to the public.

Obsolete equipment is properly salvaged through use of a recycling company.

Best Practices

The financial justification used to propose a replacement lifecycle is usually based strictly on hard costs for the Corporation's equipment. It is recommended that "soft" costs also be considered when determining an appropriate lifecycle for devices. Soft cost refers mainly to lost staff productivity and technical support staff expenses. Soft costs increase with the age of the computer device. Soft costs include some of the following:

Table 1 Source Robert Frances Group (2005)

	Year 1	Year 2	Year 3	Year 4
Helpdesk Support	\$100	\$127	\$165	\$204
On-Site Support	\$75	\$114	\$152	\$210
Software Upgrades	\$50	\$86	\$120	\$140
Patch Deployment	\$114	\$131	\$153	\$191
Total Cost per Machine	\$339	\$458	\$590	\$745

Gartner, an industry leader in IT consulting and research, provides the following key findings:

- Keeping PC's longer can reduce capital expenditures, but support costs will rise and end-user productivity will decrease with PC age.
- Although the average annual total cost of ownership (TCO) is nearly the same for a desktop PC kept for four years, compared with one kept for six years, for a PC kept six years, the absolute cost is 10% higher than the cost in year four, because support cost rise as PCs get older.
- Extending the life of a mobile device to four years results in more than a 14% TCO increase in year four over year three.
- Notebook replacements are largely driven by the high failure rate
- When calculating TCO, companies also have to be sure to factor in soft costs. For instance, "for every tech support person on your staff, there are three or four [end users] in the business units who are helping with support" and those costs - plus self-support costs should be calculated into the lifecycle decision.

Gartner believes that indirect costs account for up to 60% of an organizations total outlay on Information Technology. The recommendations from Gartner are:

- Understand the trade-offs between keeping PCs longer and spending money to replace them more often, so that the balance of overall costs can be optimized.
- Significant money should not be spent on parts or labour to repair a desktop PC after its three year warranty is over.
- Buy notebooks with a three year standard warranty and retain a three-year lifecycle for notebook PCs. This is due to cost of high capacity devices with a life expectation of four years and battery life.

Overall, Gartner analysts recommend a four-year desktop lifecycle for mainstream knowledge workers and a desktop lifecycle of three years or less for high-performance users. Five years is possible in some cases, but Gartner analysts advise trying to extend the lifecycle to five years for fixed-function systems only, where the application load is limited and does not change.

This will allow us to reduce technology costs while maintaining an effective operation.

Financial Implications

Based on the suggested refresh rate provided by the Information Technology Infrastructure Lifecycle report, the Corporation will begin to replace all user computer equipment once every four years and both server and network infrastructure once every six to eight years. Equipment will be purchased through a central reserve account centrally budgeted with a stabilized cost based on the Lifecycle report. With the implementation of an IT Infrastructure Lifecycle report there is opportunity to ensure funding through Capital project budgeting or providing a single governing operating account. This further allows for infrastructure analysis, ease of repurposing and redeploying equipment without affecting depreciation schedules and reclassification of budget dollars.

The implementation of the IT Infrastructure Lifecycle report will result in increased stability within the operating budget. It is anticipated that current funding within the operating budget will provide for the associated costs contained within the Lifecycle report.

Relationship to Strategic Plan

Economic Sustainability

GOAL:

1. Attract public and private investment, support local businesses and provide excellent customer service to demonstrate we are open for business.

Actions:

Identify and quantify the City's technology requirements for the next four years for long-term cost savings, and to improve service delivery and enhance customer service.

GOAL:

2. Be an affordable city for young people, families and retired older adults.

Actions:

Optimize capital infrastructure through effective asset management and sustainable investment. Implement multi-year budgeting to improve long-term financial planning.

Social Sustainability

GOAL:

3. Connect people, places and neighbourhoods.

Actions:

To be a city that embraces connectivity between people, places and neighbourhoods.

GOAL:

4. Provide excellent customer service and communication with citizens.

Actions:

Develop and implement a plan using innovative new technologies to enhance two-way communications between residents and the City.

Environmental Sustainability

GOAL:

5. Lead in the protection of our environment for future generations.

Actions:

Establish a plan to integrate green energy and sustainable technologies in municipal infrastructure and program delivery.

Conclusion

The Lifecycle report will provide the City with efficient evergreening of the infrastructure thereby ensuring consistency and adequate computing technology moving forward. Efficiencies are gained by reduced time spent on reclassifying equipment to individual departments every time there is a movement. Additional efficiencies are gained by reducing staff time to calculate depreciation on multiple accounts. A normalized yearly budget can be achieved with timely scheduled update of outdated technology.

The Lifecycle report will work as the template to provide accurate, up to date budgetary guidance yearly. Thereby ensuring the Council, the Corporation and management are equipped with appropriate information to propose funding moving forward.

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