



**A Report to the
Audit Committee**

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Richard Riebeling

**Chief Information
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Metropolitan
Nashville
Office of
Internal Audit

Audit of Information Technology Services Software Asset Management

May 2, 2018

(July 23, 2018 – Corrected Management Corrective Action Management
Response Matrix)

Audit of Information Technology Services Software Asset Management

EXECUTIVE SUMMARY

May 2, 2018



Why We Did This Audit

Effective management of software assets not only reduces risk of non-compliance with vendor agreements, but also controls cost associated with assets, and is an essential part of cybersecurity.

What We Recommend

- Operational procedures specific to management of software assets, from acquisition to retirement, should be established to ensure consistency, reduce errors, and enhance continuity of service.
- Improve software asset management practices.

BACKGROUND

Metropolitan Nashville Government's Information Technology Services, hereinafter referred to as ITS, manages enterprise software and employs other types of computer programs for operational purposes, including commercial software, shareware, and freeware. ITS manages more than 8,200 workstations, plus over 1,000 physical and virtual servers. About 6,640 of the workstations and 900 servers are managed in the Microsoft System Center Configuration Manager tool. Exhibit A shows ITS software expenditures for fiscal years 2015, 2016, and 2017.

Exhibit A - ITS Software Purchases vs. Non-payroll Expenditure

| All ITS Funds | FY 2015 | FY 2016 | FY 2017 |
|--------------------------|--------------|--------------|--------------|
| Non-payroll Expenditures | \$25,308,687 | \$22,225,576 | \$27,451,025 |
| Software and Licenses | 4,719,625 | 6,448,949 | 7,924,374 |
| Software Percentage | 19 | 29 | 29 |

Source: Metropolitan Nashville Government's EnterpriseOne Financial System

OBJECTIVES AND SCOPE

The objectives of this audit are to determine if:

- Governance structures are in place to provide strategic direction for software asset management.
- Controls in processes governing software purchased by ITS are effective.
- ITS is entitled to all software installed on its resources.

The scope of the audit is software acquired, used, and managed by ITS.

WHAT WE FOUND

Governance structure over software asset management exists. However, consistent practices and detailed procedures and plans did not exist to provide guidance for software asset management.

GOVERNANCE

Information Technology Services is empowered by Metropolitan Nashville Code of Law to review all proposed computer-related purchases of the Metropolitan Nashville Government and advise the purchasing agent or the requesting department whether the proposed purchase is appropriate for the need (see Exhibit B for Metro ITS Organizational Chart).

Former Mayor Megan Barry's Executive Order #34 in 2016, affirmed the previous mayor's executive order to establish the Information Security Steering Committee, which should advise the ITS director on information security policies, standards, and practices for the Metropolitan Nashville Government.

SOFTWARE ASSET MANAGEMENT LIFECYCLE

A typical asset lifecycle includes five phases, namely planning, requisition, deployment, maintenance, and retirement. An effective software asset management system should embed control activities into the entire lifecycle of an asset, to mitigate risks such as waste of resources, copyright infringement, license agreement violation, and business interruption. These activities may include software authorization, requisition, deployment, change control, disaster recovery, and license management (which may further include license tracking, recycling, and auditing). Following is a discussion of control activities practiced by ITS through the software asset lifecycle.

Planning

ITS Divisions conduct internal planning sessions before the acquisition of computer programs for their operations. The ITS Executive Leadership Team requires justification for, analyzes said justifications and approves major software purchases for the department, and for the software and Enterprise Applications that are used by other departments and agencies as well.

Requisition

The IT Procurement Division has a managed process in place to follow Metro-wide procurement regulations. This ITS division works with other divisions on software budgets. All division managers approve their own purchase orders, review invoices, and approve payments upon receipts. In addition, this division conducts a true-up process for products included in the Microsoft enterprise agreement. This process can be the starting point for a software asset inventory and license tracking system.

Deployment

Deployment is the process of ensuring that purchased software assets are in operational or productive use. ITS provides deployment services to other departments. Deployment procedures can be used as one of the controls for license verification and tracking. Some software vendors have proprietary built-in control of license utilization enabled at the time of installation.

Maintenance

ITS has a managed change control process. System configuration tools are available in ITS for detecting and monitoring programs installed on devices that are active on the Metropolitan Nashville Government network.

Retirement

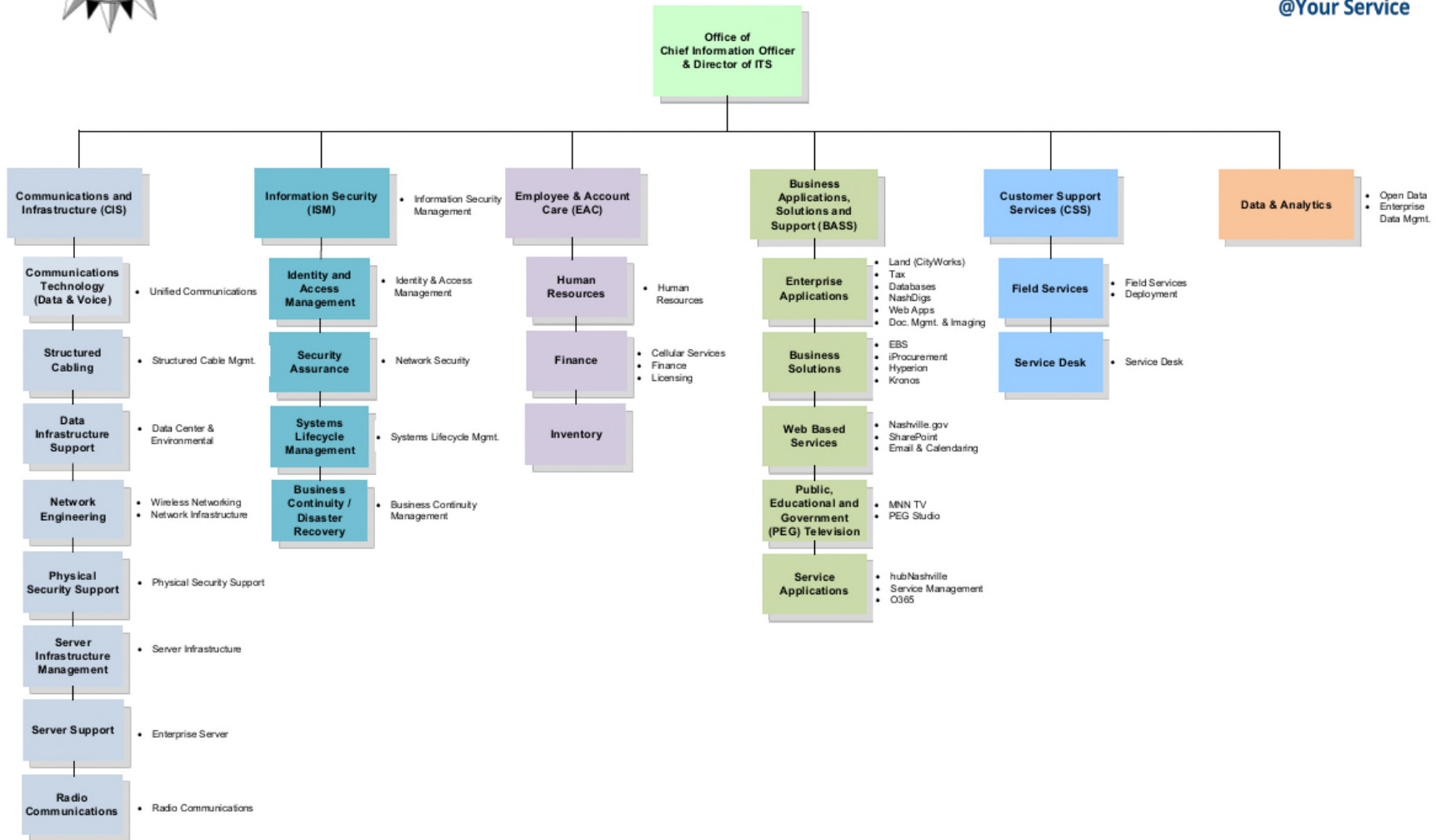
The Customer Services Division has a documented hard drive wipe and destruction process where software assets can be identified for license recycling.

Exhibit B – Information Technology Services Organizational Chart

Metropolitan Government of Nashville & Davidson County INFORMATION TECHNOLOGY SERVICES



Strategic Roadmap to Division Mapping



OBJECTIVES AND CONCLUSIONS

1. *Are information technology governance structures in place to provide strategic direction for software asset management?*

Yes. Two policies exist that guide the use of software assets in the Metropolitan Nashville Government; they are the *Information Technology Assets Acceptable Use Policy* and *Inventory Ownership of Assets Policy*.

2. *Are controls in the management of software purchased by ITS effective?*

Generally, no. Although some controls exist in different functions in ITS, they are not working in sync to ensure effective management of software assets. However, operational procedures specific to management of software assets, from acquisition to retirement, should be established to ensure consistency, reduce errors, and enhance continuity of service. (See Observations A and B.)

3. *Is Information Technology Services entitled to all software installed on its resources?*

Undeterminable. A complete list of licensed software used by ITS, along with information regarding license type, quantity purchased, utilization, and availability is not available. Tools such as System Center Configuration Manager are not used to cover all active devices. (See Observations B.)

AUDIT OBSERVATIONS

Internal control helps entities achieve important objectives to sustain and improve performance. The Committee of Sponsoring Organizations of the Treadway Commission (COSO), Internal Control – Integrated Framework, enables organizations to effectively and efficiently develop systems of internal control that adapt to changing business and operating environment, mitigate risks to acceptable levels, and support sound decision-making and governance of the organization.

Control Objectives for Information and Related Technologies, as a best practice framework for information technology profession, recommends information technology operational managers to define and communicate policies, plans, and procedures that drive all information technology processes.

Observation A – Enhance Software Asset Management Procedures

Guidance for managing software assets lacks in existing procedures. Although ITS has multiple operational procedures in place, such as software purchasing, change management, and system retirement; practices of software inventory and license tracking are not present in those procedures. The risks associated with non-compliance with software licensing agreements such as potential fines, business interruption, and adverse public image are not mitigated.

Criteria:

- COSO, Control Activities—Principle 12—The organization deploys control activities through policies that establish what is expected and procedures that put policy into action.
- Metropolitan Nashville Governments Information Security Policy Number 10 - *Inventory Ownership of Assets Policy* – “*Metropolitan Government shall develop and maintain an inventory of its software and applications.*” and “*All software and applications must be fully licensed and supported.*”

Recommendations for management of ITS to:

Establish a software asset management initiative to incorporate license-tracking procedures into all relevant functions, such as purchasing, deployment, change management, customer services, and assets retirement.

Observation B – Inconsistent Software Asset Management Practices

ITS does not have a comprehensive system to manage software for its lifecycle. A review of ITS software asset management practices noted:

- The Metropolitan Nashville Government has received unfavorable findings from a software license audit by Oracle Corporation. This was resolved in May 2017 through the creation of a new Unlimited License Agreement and Enterprise-wide management by ITS.
- Not all divisions perform regular verification and reconciliation of software licenses as recommended in Information Security Policy Number 10 - *Inventory Ownership of Assets Policy*. The Procurement Division performs an annual reconciliation and true-up process for Microsoft programs purchased under the Dell Enterprise agreement. However, this process does not include other programs. A complete list of programs is not available showing license type, purchased quantity, availability, and deployment.
- A uniform tracking system lacks to maintain a list of software deployed for either metro-wide utilization or internal ITS operational purposes. A cost-benefit analysis was performed years back to explore the option of acquiring a solution, but the results determined that the cost of acquiring and maintaining a software asset management system outweighs the benefits.
- While ITS has a software procurement process following the Metropolitan Nashville Government’s procurement rules and regulations, the procedure is not documented internally to facilitate license management and ensure consistent practice. One example was when Dell changed the delivery method of licenses; a division manager was unable to determine the time when the software was received.
- A procedure exists in the Customer Support Services Division for retiring and disposing of software assets installed on ITS resources. However, this process does not include any steps regarding the release of licensed software installed under either enterprise agreements or other applicable software agreements.
- A complete list of programs with licensing information did not exist. Utilization of existing tools, such as Microsoft System Center Configuration Manager, can be explored for effective tracking of installed programs. Other Microsoft features, such as AppLocker or Software Restriction Policy, can be explored to assist software listing (black or white).

Criteria:

- COSO, Control Activities—Principle 11—The organization selects and develops general control activities over technology to support the achievement of objectives.
- Metropolitan Nashville Governments Information Security Policy Number 10 - *Inventory Ownership of Assets Policy* – “Metropolitan Government shall develop and maintain an inventory of its software and applications.” and “All software and applications must be fully licensed and supported.”

Recommendations for management of ITS to:

1. Reconsider the long-term benefits of a software asset management system to address both ITS internal and Metro-wide system tracking and compliance monitoring. Such a system can facilitate in-depth analysis of software license position by automating software data collection, evaluating software license entitlement, and highlighting opportunities to minimize risks and optimize costs.
2. Identify, distribute, and regularly update a list of authorized and supported software applications (whitelisting).
3. Educate and train employees to understand policies and best practices regarding the software asset management processes, roles, responsibilities, and acceptable use.

GOVERNMENT AUDITING STANDARDS COMPLIANCE

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our observations and conclusions based on our audit objectives.

METHODOLOGY

To achieve the audit objectives, auditors performed the following steps:

- Interviewed key personnel within the Metropolitan ITS Department.
- Reviewed the ITS *Information Technology Assets Acceptable Use* and *Inventory Ownership of Assets* policies, Mayoral Executive Orders related to Information Security, Information Technology standards, and industry practices.
- Reviewed ITS' software enterprise agreements and other contracts.
- Reviewed the current and potential functionality of ITS's software discovery tool, Microsoft System Center Configuration Manager.
- Evaluated internal controls currently in place.
- Reviewed sample selections to determine the effectiveness of internal controls.
- Reviewed financial related transaction files using audit analytic software.
- Considered risk of fraud, waste, and abuse.
- Considered information technology risks.

AUDIT TEAM

Innocent Dargbey, CPA, CMFO, MBA, MSc, In-Charge Auditor

Qian Yuan, CIA, CISA, ACDA, CMFO, Quality Assurance

Mark Swann, CPA, CIA, CISA, CFMO ACDA, Metropolitan Auditor



Metropolitan Government of Nashville and Davidson County
David Briley, Mayor

Information Technology Services Department
Keith Durbin, CIO/Director of IT Services

April 25, 2018

Mr. Mark Swann
Office of Internal Audit
222 Third Avenue North, Suite 401
Nashville, Tennessee 37201

RE: Audit of ITS Software Asset Management

Dear Mr. Swann:

This letter acknowledges receipt of the ITS Software Asset Management Audit Report and Recommendations. The recommendations will be implemented per the attached schedule. We are confident that the recommendations will help ITS improve our existing processes to manage departmental software assets with the intent that we can further apply those recommendations to other Metro departments and agencies.

We appreciate the work that you, Innocent Dargbey and Qian Yuan did on this audit. On behalf of ITS, thanks to you and your staff for performing the audit in such a professional and timely manner.

Sincerely,

A handwritten signature in black ink, appearing to read "Keith Durbin", written in a cursive style.

Keith Durbin
CIO/Director

APPENDIX A – MANAGEMENT RESPONSE AND CORRECTIVE ACTION PLAN

We believe that operational management is in a unique position to best understand their operations and may be able to identify more innovative and effective approaches, and we encourage them to do so when providing their response to our recommendations.

| Recommendation | Concurrence and Corrective Action Plan | Proposed Completion Date |
|---|---|--------------------------|
| <i>Recommendations for management of ITS to:</i> | | |
| A.1 - Establish a software asset management initiative to incorporate license-tracking procedures into all relevant functions, such as purchasing, deployment, change management, customer services, and assets retirement. | Accept – Develop process for tracking ITS software purchases, enterprise applications managed by ITS and purchases for other departments that are made by ITS-Procurement | 06/30/2018 |
| B.1 - Reconsider the long-term benefits of a software asset management system to address metro-wide system tracking and compliance monitoring. Such a system can facilitate in-depth analysis of software license position by automating software data collection, evaluating software license entitlement, and highlighting opportunities to minimize risks and optimize costs. | Accept – Prior to FY20 budget season; we will assess the new practices in place; the cost of a software asset management system; and the cost benefit to purchasing of said system. | 1/30/2019 |
| B.2 - Identify, distribute, and regularly update a list of authorized and supported software applications (whitelisting). | Accept – for ITS-owned and enterprise application software managed by ITS use of application whitelisting as a security control is to be assessed and implemented. A centralized listing of all approved and ITS supported software is being built as part of meeting recommendation A1. | 01/30/2019 |
| B.3 - Educate and train employees to understand policies and best practices regarding the software asset management processes, roles, responsibilities, and acceptable use. | Accept – we will include this training as part of implementing recommendation A1. | 06/30/2018 |