

**REDACTED PURSUANT TO CODE OF VIRGINIA
SECTION 2.2-3705.2(2)&(14) (IT SYSTEMS SECURITY)**

Internal Audit Report on Libraries Technology Controls

County of Henrico



*Proud of our progress;
Excited about our future*

**Internal Audit Report #265
July 18, 2018**

HENRICO COUNTY INTERNAL AUDIT
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Internal Audit Report on Libraries Technology Controls



Report #265
July 18, 2018

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Audit Summary

- Scheduled Audit
- Conclusions on Audit Objectives (refer to Slide 15)
- Exception Oriented
- 2 reportable Issues
- 2 Other Observations
- Control improvements were implemented during the audit
- Management Action Plans have been developed to address three identified risks and Libraries is proposing to accept one identified risk



Contents

- Introduction and Background
- Scope, Internal Controls, and Methodology
- Conclusions on Audit Objectives
- Issues, Other Observations and Management Action Plans
- Closing and Report Distribution



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Introduction

- IT Auditor III Sharon Thornton performed audit work
- Used professional auditing standards
- Examined controls & tested for selective compliance
- All exceptions given to Agencies
- Reported control design issues & significant test exceptions
- Work for same Government we audit



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Background

Libraries' Mission


Henrico County Public Libraries' (HCPL) mission is to promote reading and lifelong learning, connect people with the information they need, and enrich community life. HCPL accomplishes this by delivering excellent library service and by providing access to not only print materials, but to technology as well. HCPL is responsive to the needs of a community that is focused on literacy and education.



Background

Technology

Henrico County Public Libraries are home to 533 public computer workstations, including 28 laptops that are available for checkout at the desk to use in the library. Color and black and white printers, scanners and Wi-Fi are available as well.




Background

Library Locations

Fairfield Area	Sandston Branch
Gayton Branch	Tuckahoe Area
Glen Allen Branch	Twin Hickory Area
Libbie Mill	Varina Area
North Park Branch	Mobile Library Service

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Background


FY17 Statistics

Measures	FY17
Digital Items (Electronic Materials)	766,085
Online Databases (Electronic Collections)	37,313
Digital Media Lab Bookings	243
Digital Media Lab Attendance	1084
Number of Self-Service Check-Out Transactions	1,479,419
Number of Self-Service Check-In Transactions	1,449,288
Number of Library Web Site Visits	3,095,992
Number of Customers using Public Workstations	187,308
Number of Public Wi-Fi Connections by Customers	1,725,239
Number of Electronic Databases Available*	66

*Includes 35 databases provided by Library of Virginia

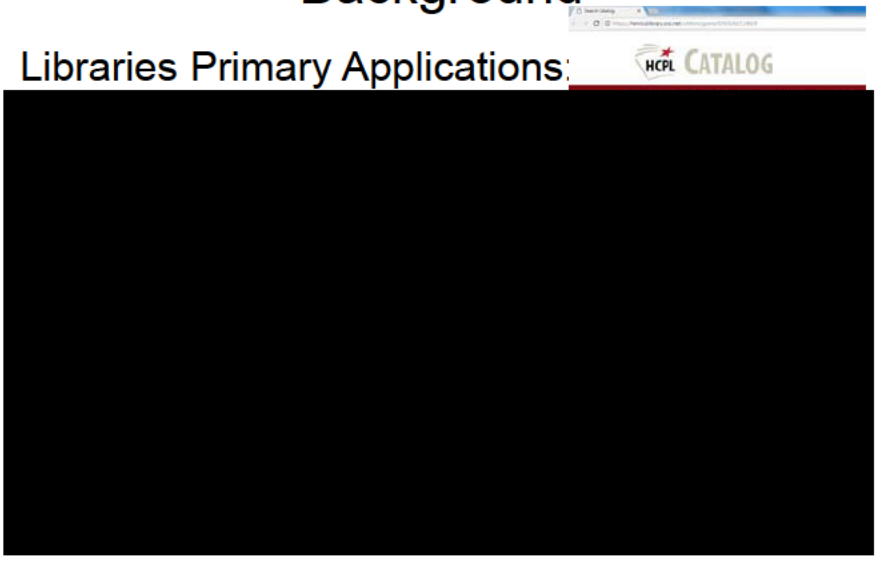
Source: Library Approved Budget FY17

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Background

Libraries Primary Applications:




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Background

Library Servers:




These are managed by County Information Technology.

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Audit Scope

In Scope:
Libraries
 Libraries Technology
 [Redacted] SaaS in the Cloud and related links
 [Redacted] application
Information Technology
 Libraries virtual servers and data storage
 Server patches



Out of Scope:
All other agencies, divisions, departments, applications, and servers


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Internal Controls

Objectives

- Reliability and integrity of information
- Compliance with policies, procedures, laws and regulations
- Safeguarding of assets
- Effectiveness and efficiency of operations



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Internal Controls Cont'd

General Limitations of any Controls


- Errors and irregularities may go undetected
- Inherent limitations in any control structure which include resource constraints, legislative restrictions, etc.
- Projection to future subject to risk of change in effectiveness
- Compliance may deteriorate



Audit Methodology

1. Evaluated internal control systems through completion of questionnaires
2. Validated answers to questionnaires by sample testing and securing evidence
3. Performed walkthroughs to obtain an understanding of the technology processes
4. Evaluated applicable regulations, policies & procedures and sample tested for compliance






Conclusions on Audit Objectives

Objective	Conclusion
A. Evaluate protection and safeguards to County in regard to public use of computer workstations and public resources, including the Internet	▲ Issue 2
B. Evaluate security access to online services and monitoring controls to protect County network and customer data	■
C. Evaluate protection and safeguards to County and customers in regard to Wi-Fi connections	■
D. Evaluate the system controls of [REDACTED] and [REDACTED], including access controls, operation controls, and change controls	▲ OO1
E. Evaluate the adequacy of performance related to the system incident handling and problem management responses	■
F. Determine that application-related controls that affect money-handling are sufficient	▲ Issue 1, OO2

■ Sufficient
 ▲ Needs Improvement
 ◆ Insufficient – Needs Immediate Attention

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- ## Issues
1. Eliminate Sharing of [REDACTED] and [REDACTED] UserID's/Passwords by Libraries Personnel (Libraries)
 2. Strengthen Patch Process for Libraries Servers (Information Technology)
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Other Observations

- OO1. Revise Notifications Related to [REDACTED] Administrator Password to Two Separate Emails (Libraries)
- OO2. Verify Control Total for the Unpaid Library Bills Written Off (Libraries)



Issue 1

Eliminate Sharing of [REDACTED] and [REDACTED] UserID's/Passwords by Libraries Personnel (Libraries)



Issue 1

Condition

Libraries personnel are sharing UserID's and passwords in [REDACTED] and [REDACTED].

In [REDACTED], circulation functions include:

- checking out/in
- putting items on hold
- registering user
- looking up items
- looking up in-transit
- modifying user information
- entering serial information
- basic editing of catalog records
- paying bills.


Additional financial transactions by staff include:

- Cancel (\$2.00 and under)
- Forgive (\$2.00 and under)
- Refunds (\$1.00 and under)

Staff also collects funds from Kiosk machines (these functions are in [REDACTED]) and enters them into a separate cash register.

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Issue 1


Condition

Per Libraries management, there are some mitigating manual controls which depend on staff compliance with policy:

- Supervisors approval on transactions exceeding certain dollar threshold
- Refunds:
 - [REDACTED] – 3-part receipt (1) patron, (2) business office, (3) branch paperwork.
 - [REDACTED] – same 3-part receipt and screen shot of the [REDACTED] account with the money on it and another screen shot after the refund showing \$0 balance. Above \$1, the documentation goes to the Business Office using the County Reimbursement – Refund form.
- Cameras on the desks in all but 2 branch locations (Fairfield and North Park)
 - Today, these two sites are staffed as follows with individuals sharing ID's:
 - ❖ Average staff per day during week: Fairfield 17, North Park 13
 - ❖ Average staff Friday and Saturday: Fairfield 9, North Park 7

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Issue 1

Effect


Sharing UserID/Passwords reduces accountability and segregation of duties. This is of particular concern related to modifying user information and transactions including Forgive, Cancel (\$2.00 and under), and Refunds (\$1.00 and under) which rely on the noted manual mitigating controls for compliance.

Cause

Decisions related to how best to serve customers considering how long it takes for one user to log out and another to log in. Additionally, changing passwords increases the likelihood of forgetting passwords and introduces difficult and time-consuming efforts to resolve.

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Issue 1

Criteria

ISACA's COBIT 5, A Business Framework for the Governance and Management of Enterprise IT, Manage Business Process Controls includes best practices; (1) manage the business roles, responsibilities, levels of authority and segregation of duties needed to support the business process objectives and (2) ensure that business information can be traced to the originating business event and accountable parties.

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Issue 1

Recommendation

We recommend that all Libraries personnel with the ability to affect financial transactions (which include Cancel, Forgive, and Refund) have unique UserID's/Passwords in [REDACTED] and [REDACTED].

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Issue 1

Management Action Plan

- a. As of July 2018, the Library is submitting a Risk Acceptance request given the impacts to customer service for full compliance.
By whom: Library Director and Library Technology Coordinator
When: July 16, 2018
- b. Included in the request, wherever customer service is not impacted, HCPL will migrate to subdivided groups based on roles with ID assignment tracking controls for specific staff assigned. These role-based IDs will be built by Library IT.
By whom: Library Technology Coordinator and [REDACTED] Administrator
When: IDs built by August 1, 2018 and implemented by September 1, 2018.
- c. Review of Forgive, Cancel, and Refund transactions reports started July 2, 2018 and run by [REDACTED] Administrator. Daily review by Circulation Head and Branch Manager at each location started July 2, 2018; Monthly review by system-wide Circulation Coordinator at Library Headquarters starts August 1, 2018; Annual review by Library Comptroller, Library Director, and Public Service Administrators at Library Headquarters starts July 1, 2019.

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Issue 1

Management Action Plan

- d. There will be an annual training review of Forgive, Cancel, and Refund procedures for all staff starting July 26, 2018 and annually the fourth week in July thereafter. Documentation of staffing schedules will be retained for at least sixty days.
By Whom: System-wide Circulation Coordinator
When: July 26, 2018
- e. County IT has agreed to install security cameras for North Park Branch.
By Whom: Library Technology Coordinator and Library Director
When: January 2019
- f. When the new Fairfield Area library is relocated and opened in October of 2019, that site will also be covered with security cameras.
By Whom: Library Technology Coordinator and Library Director
When: September 2019

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Issue 2

Strengthen Patch Process for Libraries Servers (Information Technology)

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Condition

Libraries server patches are not being installed on a regular, monthly basis.

IT's policy is to only apply system patches that are identified as critical by the vendor which are loaded in the County's KACE patch deployment system. During a review of patching related to Libraries servers, we noted the following:

1. Per review of IT's email notifications to Libraries staff regarding scheduled Libraries patches, we observed that the patches for Libraries servers were not being scheduled to run monthly. The patches per these notifications for 2017 indicated they were scheduled to run January 29, May 7 (April's patch), August 6 (July's patch), October 1 (September's patch), October 29, and December 3 (November's patch).




Condition

2. On the 2/4/2018 patch results for Libraries patches, we noted 3 servers had errors. Two of these were corrected on the next patching cycle on 4/2/2018. One server was retired on 3/23/2018.

IT's procedure for patch errors is to wait until after the next monthly patch to see if the patch errors cleared or are successful in the next month's patching schedule.

Effect

Not keeping server patches up-to-date could result in exposure to widely known security vulnerabilities for which fixes have already been issued. (Note that the majority of findings on the past County Vulnerability Assessments have related to missing patches.)



Issue 2


Cause

- Reliance on a manual scheduling process and having a specified patch window to conduct maintenance operations.
- When multiple patches are being deployed by KACE, County IT often sees failures for one or two patches from the management console. However, actual patch deployment logs will also show contradicting information. Server reboots have been shown to clear patch status issues in the management console; but, reboots are not always done as they can be detrimental to business operations, difficult to schedule and time consuming for support staff.

Criteria

COBIT 5 Manage Risk best practice is to respond in a timely manner with effective measures to limit the magnitude of loss from IT-related events and to identify problems and their root causes and provide timely resolution to prevent recurring incidents.


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Issue 2

Recommendation	Management Action Plan
1. Schedule patching on a monthly basis	<p>Review of KACE history shows that patches were in fact applied every month with the exceptions noted below:</p> <ul style="list-style-type: none"> • Feb 2017 – No patches were issued in February per Microsoft. • March 2017 – Because of how this month fell, Henrico Library servers were patched April 9. • May and June – No documentation to support why these were not done. • November 2017 – Planned deferment, rationale is IT typically does not apply monthly patches across the board (HCG or HCPL) when they fall on County Holidays near the end of the calendar year because many IT staff are out and would be unable to provide support should there be any issues post-patching. <p>We have decided to permanently schedule patching of HCPL servers on the first Sunday of every month and are changing the configuration in KACE to reflect this decision. This should eliminate any lapses in the future.</p> <p>In a review of the associated communications, Henrico IT does need to do a better, more consistent job of communicating with Henrico Library IT when patching will occur. We will work on operationalizing all future communications.</p> <p>By Whom: IT Manager, System Engineering When: 6/25/2018</p>


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Issue 2

Recommendation	Management's Action Plan
<p>2. Establish a monitoring control to ensure and validate appropriate patching results which could include the use of additional KACE patching reports as well as reporting results to Library support staff.</p>	<p>Henrico IT is pursuing patch management software options to replace KACE for managing server patching. Though KACE has effectively managed Microsoft patching, it is less than ideal based on feedback from Audit and ongoing specifications and reporting needs by IT.</p> <p>This currently is an un-funded initiative but IT's Systems Engineering team will be narrowing down the potential candidates to recommend to IT management for funding in the coming fiscal year.</p> <p>By Whom: IT Manager, System Engineering When: December 31, 2018</p>


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Other Observations

The following slides include additional observations noted during our audit which were considered less critical in reaching our conclusions on the audit objectives.

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001

[Redacted text]

[Redacted text]

[Redacted text]


[Redacted text]

[Redacted text]

[Redacted text]

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001


Management Action Plan

[Redacted text]

By Whom: Libraries Technology Coordinator
When: 6/14/2018

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Verify Control Total for the Unpaid Library Bills Written Off


The listing of Unpaid Library Bills for patrons' accounts with no activity in 5 years does not produce totals. A separate report is generated from the system to obtain these totals. This amount is submitted to Finance as a proposed write-off of uncollectible accounts and, once approved, the balances are purged from the system.

It has not been a requirement of County Finance to provide the detailed listing and Libraries did not perform a reasonableness check to verify that the balance written off agrees to the detailed listing of customer accounts.

Recommendation

Implement a process to verify the totals produced for the report of unpaid bills of patrons with no activity in 5 years to evaluate the reasonableness of the individual accounts purged from the system.

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Management Action Plan

New procedures have been put in place going forward to verify the reasonableness of the totals reported. Next possible test is Winter 2018 with next scheduled purge.

By Whom: Libraries Director, Technical Coordinator, [REDACTED]
Administrator


When: 11/30/2018

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Control Improvements Implemented during the Audit

#	Control Weakness Observed	Control Improvement Implemented
C.1	There had been no periodic reviews of Library VPN users to ensure access was still needed.	Management implemented a procedure with IT's agreement to review Library VPN users annually and a recurring calendar reminder was setup for this review.




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Control Improvements Implemented during the Audit

#	Control Weakness Observed	Control Improvement Implemented
C.2	While County IT has issued password guidance encouraging users not to use the same password for various County access needs, the Library policies did not reinforce or refer to this guidance about not using the same password in multiple systems.	Management has documented guidelines for the tech support team about not using the same password in multiple systems.




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Closing

- Appreciate Agencies' cooperation
- Follow up on open Action Plans will be performed as completion dates are reached or after sufficient time has passed to ensure the actions are effective and ongoing.



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Report Distribution

Audit Committee (Mrs. O'Bannon, Mr. Thornton, County Manager)	Board of Supervisors, Non-Committee Members
Deputy County Manager for Administration	Directors of Libraries and Information Technology
Internal Audit Staff	

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