Office of the Auditor General
Performance Audit Report

Software License Management

Department of Technology, Management, and Budget

July 2022

State of Michigan Auditor General
Doug A. Ringler, CPA, CIA

071-0527-22

The auditor general shall conduct post audits of financial transactions and accounts of the state and of all branches, departments, offices, boards, commissions, agencies, authorities and institutions of the state established by this constitution or by law, and performance post audits thereof.

The auditor general may make investigations pertinent to the conduct of audits.

Article IV, Section 53 of the Michigan Constitution

OAG
Office of the Auditor General

Report Summary

Performance Audit

Software License Management

Department of Technology, Management, and Budget (DTMB)

Report Number:
071-0527-22

Released:
July 2022

Software license management is a process to ensure software licenses, license entitlements, and license usage are accurately recorded. License purchasing and entitlement information is recorded in FlexNet, the State's software license management tool. The most optimal software license management helps minimize risks by ensuring cost-effective compliance with software licensing agreements. Software license management is DTMB's responsibility, in conjunction with State agencies. As of October 2021, State of Michigan workstations and servers contained approximately 3,200 commercially licensed software applications from approximately 650 software publishers.

Audit Objective	Conclusion
Objective: To assess the sufficiency of DTMB's software license management controls.	Not sufficient

Findings Related to This Audit Objective	Material Condition	Reportable Condition	Agency Preliminary Response
Better monitoring is needed to ensure cost-effective compliance with the State's software licensing agreements. For example, DTMB's monitoring did not enable it to calculate the total amount expended on software licenses, account for license usage for 9,000 devices, or coordinate purchases of licenses for software used by multiple State agencies (Finding 1).	X		Partially agrees
As of September 2021, DTMB tracked software licenses and entitlement information in FlexNet for only 181 (6%) of the State's approximately 3,200 commercially licensed software applications (Finding 2).	X		Partially agrees
Establishment and monitoring of metrics along with further implementation of centralized practices could foster improvements in software license management (Finding 3).		X	Partially agrees

Obtain Audit Reports

Online: audgen.michigan.gov

Phone: (517) 334-8050

Office of the Auditor General
201 N. Washington Square, Sixth Floor
Lansing, Michigan 48913

Doug A. Ringler, CPA, CIA
Auditor General

Laura J. Hirst, CPA
Deputy Auditor General

OAG
Office of the Auditor General

Doug A. Ringler, CPA, CIA
Auditor General

201 N. Washington Square, Sixth Floor • Lansing, Michigan 48913 • Phone: (517) 334-8050 • audgen.michigan.gov

July 8, 2022

Ms. Michelle Lange, Acting Director
Department of Technology, Management, and Budget
and
Ms. Laura Clark, Chief Information Officer
Department of Technology, Management, and Budget
Elliott-Larsen Building
Lansing, Michigan

Dear Ms. Lange and Ms. Clark:

This is our performance audit report on Software License Management, Department of Technology, Management, and Budget.

Your agency provided preliminary responses to the recommendations at the end of our fieldwork. The *Michigan Compiled Laws* and administrative procedures require an audited agency to develop a plan to comply with the recommendations and to submit it to the State Budget Office upon completion of an audit. Within 30 days of receipt, the Office of Internal Audit Services, State Budget Office, is required to review the plan and either accept the plan as final or contact the agency to take additional steps to finalize the plan.

We appreciate the courtesy and cooperation extended to us during this audit.

Sincerely,

Doug Ringler

Doug Ringler
Auditor General

This Page Left Intentionally Blank

TABLE OF CONTENTS

SOFTWARE LICENSE MANAGEMENT

	Page
Report Summary	1
Report Letter	3
Audit Objectives, Conclusions, Findings, and Observations	
Software License Management Controls	8
Findings:	
1. Monitoring of the State's software licenses needed.	10
2. Improvements needed to the State's inventory of software licenses.	13
3. Improved software license governance needed.	16
Finding 1 Agency Preliminary Response and Auditor's Comments to Agency Preliminary Response	20
Description	25
Audit Scope, Methodology, and Other Information	26
Glossary of Abbreviations and Terms	30

This Page Left Intentionally Blank

AUDIT OBJECTIVES, CONCLUSIONS, FINDINGS, AND OBSERVATIONS

SOFTWARE LICENSE MANAGEMENT CONTROLS

BACKGROUND

The State acquires IT software based on an agency-determined need for a software solution. After review and negotiation of the corresponding software licensing agreement*, the Department of Technology, Management, and Budget (DTMB) or State agencies purchase the software license* either directly from the publisher or through an approved software reseller in the Michigan Master Computing Program (MMCP). DTMB or State agencies install the acquired software on the appropriate workstations or servers. The license purchase and entitlement* information is then onboarded into FlexNet*, the State's software license management tool. FlexNet collects software usage information, allowing for monitoring of the onboarded software.

As of October 2021, approximately 3,200 commercially licensed software applications from approximately 650 software publishers were installed on State of Michigan (SOM) workstations and servers, such as:

- Oracle Database 12c R2 Enterprise
- Microsoft Office Project 2016
- Adobe Acrobat DC 2021
- Red Hat Enterprise Linux 7.9

AUDIT OBJECTIVE

To assess the sufficiency of DTMB's software license management controls.

CONCLUSION

Not sufficient.

FACTORS IMPACTING CONCLUSION

- Two material conditions* related to needed improvements in:
  - Monitoring of software licenses (Finding 1).
  - The State's software license inventory (Finding 2).
- Reportable condition* related to improved software license governance (Finding 3).
- DTMB implemented FlexNet in June 2020 to manage and optimize the State's software licenses.

** See glossary at end of report for definition.*

- DTMB established various processes related to software license management, such as:
    - Identification and remediation of at-risk events*.
    - Acquisition and installation of commercially licensed software.
    - Device reconciliations to ensure State servers and workstations report software usage information to FlexNet.
- DTMB established a governance charter for its software license management program.

** See glossary at end of report for definition.*

FINDING 1

Monitoring of the State's software licenses needed.

DTMB should fully monitor the State's software licenses to help ensure compliance with software licensing agreements, minimize the risk of fines and penalties assessed by software publishers, and identify potential cost savings opportunities.

SOM Technical Standard 1340.00.060.10 requires DTMB to monitor software licenses and assist agencies with compliance of software licensing agreements. According to Control Objectives for Information and Related Technology* (COBIT), organizations should monitor software licenses by comparing software usage with license entitlements to inform the following decisions:

- When software usage is lower than total license entitlements purchased (underutilization), evaluate whether there is a need to retain or terminate software licenses, considering the potential to save on unnecessary maintenance, training, and other costs.

- When software usage is higher than total license entitlements purchased (overutilization), evaluate whether instances can be uninstalled that are no longer required or justified or additional software licenses should be purchased, if necessary, to comply with the license agreement.

DTMB established an onboarding process to collect software usage information and take inventory of software license entitlement information within FlexNet. However, as of September 2021, DTMB had not fully implemented this process for commercially licensed software applications in use, thereby limiting DTMB's ability to readily monitor the corresponding software licenses.

Monitoring is needed to ensure compliance with software licensing agreements and identify potential cost savings opportunities.

We planned to evaluate DTMB's controls to monitor the State's software licenses for a sample of 80 of the approximately 3,200 commercially licensed software applications in use on State servers and workstations that report to FlexNet as of October 20, 2021. However, DTMB informed us it would take approximately 9 months to provide us the documentation necessary to complete our audit procedures for an initial sample of only 10 software applications, 2 of which DTMB indicated had been onboarded to FlexNet (see the audit scope section). DTMB asserted that providing this documentation would require it to complete the onboarding process for each of our sampled software applications, for which it had limited resources available.

We consider a 9-month period to implement the onboarding process and/or provide documentation for only 10 software applications a significant impairment to DTMB's ability to make informed, useful, and timely business decisions regarding its software licenses. At that rate, it would take DTMB several years to position itself to monitor software licenses for the 3,200 commercially licensed software applications reporting to FlexNet.

** See glossary at end of report for definition.*

According to the Information Technology Infrastructure Library* (ITIL) Guide to Software and IT Asset Management, organizations that implement good controls, including continual, rather than point-in-time software license compliance, achieve the most value from software license management.

We were unable to quantify the impact of not fully monitoring the State's software licenses because of DTMB's lack of controls and available documentation. However, we noted the following examples which illustrate the significance of this issue:

- Although DTMB could not identify the total or average amount expended on software licenses, the State's total software license cost is substantial. From the data available, we noted commercially licensed software costs of $55 and $167,000 per license and annual software maintenance costs of approximately $100,000 for two of the commercially licensed applications. Also, as of October 20, 2021, FlexNet reported approximately 470,000 individual installations of commercially licensed software on State servers and workstations.

- As noted in Finding 2, DTMB was unaware of software usage information for approximately 9,000 devices. These devices likely impact monitoring of software licenses for many software applications. Also, DTMB had not established formal processes to review information identified by FlexNet that could impact its software license monitoring, such as unrecognized software installed on devices.

- As of October 20, 2021, FlexNet reported several commercially licensed software applications had been either overutilized or underutilized by the State. Underutilization represents instances in which cost savings may be available to the State, such as through reuse of the license or cancellation of unneeded maintenance. Overutilization presents risk because software publishers generally have the contractual right to conduct audits and assess penalties for noncompliance with software licensing agreements. These instances were not confirmed and would require DTMB to further investigate the validity and implications of the information reported by FlexNet.

- State agencies may be purchasing software when available licenses exist elsewhere within the State. State agencies informed us, when additional software licenses are needed, they sometimes purchase licenses without consideration of unused licenses available at other agencies. Although funding restrictions may preclude an agency from acquiring licenses purchased by another

** See glossary at end of report for definition.*

department, funding restriction information had not been tracked nor had the possibility of transferring these licenses been considered at an enterprise level.

- Improvements in software license management controls have resulted in cost savings for other governmental agencies that could potentially be achieved by the State. For example, a U.S. Government Accountability Office (GAO) report on federal software licenses issued in 2014 noted the U.S. Department of Veterans Affairs (VA) avoided approximately $50 million in software licensing costs over a two-year period after analyzing its software licensing data. Although the VA has a significantly larger budget, the State could potentially achieve proportionate cost avoidance relevant to its own budget, demonstrating the importance of software license management controls.

DTMB informed us it believes monitoring of software licenses is the responsibility of each individual State agency. However, this responsibility has been assigned to DTMB within SOM standards. Also, as the system owner, DTMB informed us it has restricted access to FlexNet to allow only State agencies to manage and view the software licenses they have been allocated. During our review, we noted many of the same software applications were used across multiple State agencies. Therefore, in the current organizational structure, only DTMB has the ability to monitor the enterprise-wide software licenses. We also determined DTMB's and State agencies' lack of a comprehensive software license inventory contributed to this finding (see Finding 2).

We consider this finding to be a material condition because of the high number of software applications that were not able to be readily monitored as well as the importance of monitoring to ensure cost-effective compliance with software licensing agreements.

RECOMMENDATION

We recommend that DTMB fully monitor the State's software licenses.

AGENCY PRELIMINARY RESPONSE

DTMB partially agrees with the finding. Given the length of its preliminary response, the response and our auditor's comments are presented on page 20.

FINDING 2

Improvements needed to the State's inventory of software licenses.

DTMB, in conjunction with State agencies, did not establish a comprehensive inventory of software licenses, including purchasing and entitlement information, to help monitor software licenses purchased and in use and make informed business decisions.

Given the lack of comprehensive software license inventory, we cannot estimate the cost of software applications in use across State government, including the extent to which they were over or under purchased.

SOM Technical Standard 1340.00.060.10 requires that:

- DTMB provide State agencies with the tools needed to maintain inventories of IT assets.
- State agencies ensure IT asset inventories are accurate.
- State agencies assist DTMB in the collection of information related to IT assets in their custody.

Our review of FlexNet inventory records disclosed DTMB, in conjunction with State agencies, did not:

a. Maintain a complete inventory of software licenses and entitlement information.

   According to COBIT, organizations should maintain a register of purchased software licenses and associated license agreements.

   When the State purchases licensed software, the purchasing agency records the transaction in the State's accounting and financial reporting system, Statewide Integrated Governmental Management Applications* (SIGMA). Because of inconsistent coding of these transactions within SIGMA, DTMB staff must manually identify and review each transaction to onboard the necessary license purchasing and entitlement information into FlexNet. As of September 2021, DTMB had onboarded only 181 (6%) of the approximately 3,200 commercially licensed software applications in use on State servers and workstations that report to FlexNet.

   DTMB had not onboarded 94% of the commercially licensed software in use on State servers and workstations that report to FlexNet.

   We planned to assess the accuracy of the FlexNet software inventory by reviewing DTMB's purchasing records and software licensing agreements. However, as noted in Finding 1, because of the length of time necessary for DTMB to provide supporting documentation, we could perform only a limited review of the

** See glossary at end of report for definition.*

completeness of FlexNet inventory records and noted these records could be improved by:

- Ensuring software licenses and entitlement information have been onboarded for all commercially licensed software.

- Further integrating and/or reconciling financial transactions with FlexNet to ensure all purchases of licensed software are identified and inventoried.

- Ensuring proofs of license, including verification directly with publishers when software is purchased through a reseller, are linked to each software license.

- Linking software licensing agreements to individual software applications.

b. Maintain a complete inventory of software usage information.

According to COBIT, organizations should conduct audits on a regular basis to identify instances of installed licensed software.

DTMB utilizes various discovery tools to collect software installation information from the State's servers and workstations and uploads this information to FlexNet. DTMB conducts a quarterly device reconciliation to determine whether the servers and workstations recorded in other device inventory systems should be reporting to FlexNet. As of its September 2021 reconciliation, DTMB identified approximately 9,000 servers and workstations that do not report to FlexNet. Therefore, although DTMB had onboarded software license and entitlement information for 181 commercially licensed software applications, there was not a complete corresponding inventory of the number of software licenses in use for these applications. Further, the lack of a complete inventory of software usage information limits DTMB's assurance that approximately 3,200 commercially licensed software applications reporting to FlexNet represent all instances of commercially licensed software in use at the State.

DTMB informed us maintaining an inventory of software licenses is the responsibility of each State agency. However, SOM standards indicate DTMB is responsible for collecting software license information with assistance from State agencies. Also, although State agencies may maintain inventories of software licenses outside of FlexNet, a centralized inventory is necessary for DTMB to monitor software licenses (see Finding 1). In addition, 3 (50%) of the 6 State agencies we interviewed informed us they do not maintain a current software license inventory outside of FlexNet. Further, DTMB informed us some State

agencies would not allow the use of DTMB's discovery tools on their servers and workstations or these devices were exempt from DTMB management, thereby preventing DTMB from obtaining software usage information in an automated manner from all agencies.

We consider this finding to be a material condition because of the amount of software licenses not inventoried and the importance of maintaining a comprehensive inventory for monitoring software licenses.

RECOMMENDATION

We recommend that DTMB, in conjunction with State agencies, establish a comprehensive inventory of software licenses.

AGENCY PRELIMINARY RESPONSE

DTMB provided us with the following response:

DTMB partially agrees. Please reference DTMB's response to finding 1 for finding 2 because finding 1 is for the underlying process and finding 2 is about one of the objectives of the process. Below are DTMB's unique responses for finding 2.

DTMB agrees with the need for State agencies, including DTMB, to establish an inventory of software license information using a risk-based approach. Beginning in June 2020, DTMB implemented a Statewide risk-based approach for State agencies use to inventory and monitor software license information within the DTMB provided tool(s). As part of the risk-based onboarding process, purchases of commercial software licenses and entitlements (usage) are verified, and software license agreements are verified against the related software application, including the licensing agreements which DTMB maintains in registers.

The audit scope did not include a review of processes for ensuring proofs of license. SIGMA contains the proof of purchase for all software licenses, with the associated software license agreement. All software resellers under the Michigan Master Computing Program (MMCP) provide proof of purchase for all products or services purchased under the MMCP through the contract release process.

AUDITOR'S COMMENTS TO AGENCY PRELIMINARY RESPONSE*

Please reference the auditor's comments to DTMB's response to Finding 1 on page 20.

Specific to DTMB's response to Finding 2, DTMB was unable to efficiently provide documentation for us to evaluate its process for ensuring proofs of license. Our audit procedures were limited primarily to inquiry, during which DTMB asserted it had not established a process for ensuring proofs of license, including when software is purchased through a reseller. Therefore, the finding stands as written.

** See glossary at end of report for definition.*

FINDING 3

Improved software license governance needed.

DTMB should improve its software license governance. Fully mature governance ensures the efficiency* and effectiveness* of IT operations through clear and well-defined IT business processes, appropriate internal control*, and informed decision-making.

According to COBIT, effective governance includes:

- Establishment and monitoring of key metrics to determine whether the enterprise receives the expected value and benefit from its IT investments.
- Implementation of organizational structures, roles, and responsibilities that ensure enterprise requirements are met.

We noted:

a. DTMB should improve its metrics to assess the effectiveness of the State's enterprise software license management and measure the completeness and accuracy of corresponding data.

   ITIL states organizations should have quantitative measures to determine and monitor the value delivered from software license management, ensure processes and inventories are appropriate and continually improved, and ensure complete and accurate data is maintained.

   According to ITIL, organizations should establish and regularly monitor specific metrics related to:

   - License compliance: For example, the cost of properly licensed software compared with the cost of software in use, including the estimated monetary value of potential under-licensing.
   - Completeness of IT software asset data: For example, the percentage of discovered assets that are inventoried, by software application.
   - Accuracy of IT software asset data: For example, the percentage of inventoried assets, by software application, for which discovered details are inaccurate.

   DTMB established a charter for its software license management program; however, additional metrics, as described by ITIL, could be established and existing metrics improved. For example, to measure maintaining a software license inventory, DTMB tracked and prioritized the software applications to be onboarded and conducted

** See glossary at end of report for definition.*

periodic reconciliations to identify the servers and workstations that do not report to FlexNet. However, further measuring these processes against specific targets, such as the percentage of software applications onboarded over a specified period, would allow DTMB to better assess the state of its software license management program.

b. DTMB should consider fully implementing a centralized approach to enterprise software license management.

ITIL states management should establish clear overall responsibilities and policies for software license management. According to ITIL, the degree of centralization can be one of the most significant factors impacting the level of value achieved. Centralization helps organizations realize:

- The benefits of standardized processes.
- Opportunities for consolidation of software licensing data and specialization of licensing expertise.
- Cost-effective management through enterprise software license optimization.

Executive Order No. 2009-55 authorized DTMB to coordinate a unified executive branch strategic IT plan and develop and implement processes to replicate IT best practices and standards throughout the executive branch.

Our review of SOM technical standards and procedures and position descriptions of the Information Technology Asset Management Software Asset Management Optimization (ITAM SAMO) team support that DTMB has established processes and an organizational structure which could allow it to achieve the benefits of centralization described by ITIL. However, in practice, DTMB relies on State agencies to complete key software license management processes such as monitoring of software licenses and collection of inventory data. Although DTMB has provided training to State agencies on the use of FlexNet, this training could be improved to ensure State agencies have the expertise necessary to manage these processes, and additional guidance could be established outlining the information State agencies should report to DTMB to facilitate enterprise-wide decision-making.

DTMB informed us it implemented its current software license management program and FlexNet in June 2020. Because DTMB's processes were in an initial state of maturity at the time of our audit, resource limitations likely contributed to the deficiencies noted.

RECOMMENDATION

We recommend that DTMB improve its software license governance.

AGENCY PRELIMINARY RESPONSE

DTMB provided us with the following response:

DTMB partially agrees.

DTMB believes its overall governance structure is appropriate. As noted in finding 3 subpart a, DTMB established a Charter for the Governance of the IT Asset Management (ITAM) program; the Software Asset Management (SAM) program is included in the Charter. The Charter established the ITAM Governance Board in 2015 which provides for governance of the ITAM and SAM programs. The ITAM Governance Board reports to executive level DTMB personnel.

The ITAM program, which includes the SAM program, has executive level DTMB sponsorship which, according to ITIL, is considered a critical success factor to achieving value. The SAM program was implemented using DTMB's project management standards which is another ITIL critical success factor.

DTMB agrees with the need to periodically assess the SAM metrics appropriate for the State of Michigan's environment and program maturity, to measure the achievement of program goals as the Software License Management program continues to mature.

Similar to other published IT governance and operations frameworks, ITIL is not expected to be implemented in its entirety without tailoring to the organization's business context and maturity level. The centralized approach DTMB implemented is in alignment with ITIL. According to ITIL v3's ITIL Service Transition, 2011 edition, which is the basis version for the ITIL Guide to Software and IT Asset Management:

> *"ITIL is not a standard that has to be followed; it is guidance that should be read and understood and used to create value for the service provider and its customers. Organizations are encouraged to adopt ITIL best practices and to adapt them to work in their specific environments in ways that meet their needs."*

DTMB believes that the current centralized approach for the Software License Management program is appropriate for the State of Michigan's environment and IT operational model; specifically, that the agencies retain responsibility for the effective use of their budgets, including the Inter-Departmental Grant (IDG) for IT equipment and services. The responsibility for expenditure of the agencies' IDG budget extends to the agencies' decisions to purchase approved IT software. DTMB provides guidance and IT services, both centralized and federated, to support the agencies'

business needs, and to advance the agencies' use of IT for their programs.

DTMB believes, as noted in its response to finding 1, the results of the efforts to date to onboard individual installations of commercial licenses in the DTMB provided tool confirm the current centralized approach is appropriate for the State's environment. DTMB continues the coordinated effort to onboard further commercial licenses into the DTMB provided tool using a risk-based approach within our resource availability.

AUDITOR'S COMMENTS TO AGENCY PRELIMINARY RESPONSE

Please reference the auditor's comments to DTMB's response to Finding 1 on page 20.

Specific to DTMB's response to Finding 3, as noted in the finding, ITIL describes benefits that can be achieved through centralization of software license management controls. The deficiencies noted throughout the audit relate to each of the areas where ITIL specifies that organizations can benefit through centralization. This resulted in our conclusion that DTMB should consider further implementation of centralization. Also, DTMB continually delegates the management of key processes to State agencies, when DTMB, as the State's IT expert, is best positioned to manage these processes at an enterprise level. Therefore, the finding stands as written.

SOFTWARE LICENSE MANAGEMENT
Department of Technology, Management, and Budget

Finding 1 Agency Preliminary Response and Auditor's Comments to Agency Preliminary Response

This section contains DTMB's preliminary response to Finding 1 and our auditor's comments providing further clarification and context where necessary.

Overall Auditor's Comment

During the audit, DTMB was unable to efficiently provide the documentation necessary for us to determine the sufficiency of its software license management controls, which was a strong indicator the controls over software license management were lacking. This circumstance also supports our conclusion that they were not sufficient. Based on the preliminary response provided on June 15, 2022, DTMB identified new information and provided its updated status of onboarding software applications into inventory. Although it is encouraging to learn of this reported progress, we cannot confirm the accuracy of the information provided after our fieldwork or outside of our audit period. These new processes and information will be subject to our future follow-up review.

Finding 1: Monitoring of the State's software licenses needed.

DTMB provided us with the following response:

AGENCY PRELIMINARY RESPONSE	AUDITOR'S COMMENTS TO AGENCY PRELIMINARY RESPONSE
DTMB would like to respond to the OAG audit by providing additional context related to the Software License Management program. This program is designed to reduce risk for the State and was established in 2019. FlexNet was implemented in June 2020. The program is already providing value by reducing significant risk in less than two years. DTMB continues to mature the program, reduce risk, and provide value to the State by allowing agencies to calculate an accurate license compliance position and streamline license management processes through automation.*	DTMB was unable to provide the documentation necessary to demonstrate its software license management program had provided value by reducing significant risk.
DTMB partially agrees with the finding. *DTMB agrees with the need for State agencies to monitor software license position using a risk-based approach. Beginning in June 2020, DTMB implemented a Statewide risk-based approach for onboarding and monitoring commercial licensed software into FlexNet. As part of the risk-based onboarding process, purchases of commercial software licenses and entitlements (usage) are verified, and software license agreements are verified against the related software application, including the licensing agreements which DTMB maintains in registers.*	The responsibility for monitoring the State's enterprise software licenses has been assigned to DTMB within SOM standards and is necessary based on the State's IT organizational structure. Although DTMB indicates it implemented onboarding and monitoring processes in June 2020, commercially licensed software has been in use for many years. DTMB was unable to efficiently provide evidence to support implementation of the processes described.
Software licensing models vary across products and providers. Software licenses are purchased for single users, single devices, or for an enterprise-wide license which covers users across the enterprise. The audit results do not factor in the risk differential between the various software licensing models or the implemented technical controls which prevent the over-utilization of licenses. User-based software is licensed to a specific user and may only be used by the assigned user, regardless of	Finding 1 notes our initial sample of 10 commercially licensed software applications. Among other things, testing procedures for this sample were designed to allow us to verify the information DTMB had onboarded into FlexNet, such as the licensing model in use; evaluate technical controls relevant to utilization; and design further testing procedures of additional software applications. Regarding DTMB's statement "The audit results do not factor in the risk

** See glossary at end of report for definition.*

device. The risk of over-utilization is significantly reduced for software purchased for single users or under an enterprise-wide license agreement.

differential between the various software licensing models or the implemented technical controls," we contend that we *could not* consider these factors because DTMB could not timely and efficiently provide supporting documentation.

The audit report states DTMB onboarded 181 (6%) of the total commercially licensed applications as of September 2021. License compliance is measured in terms of the purchased licenses and their associated software license use rights and installations, rather than commercial applications. Analysis based on applications does not factor in the quantities of each application installed (aka number of purchased licenses installed).

As shown below, DTMB onboarded into FlexNet 38.8% and 69.5% of total individual installations of commercial applications installed in the SOM environment as of September 2021 and May 2022 (respectively):

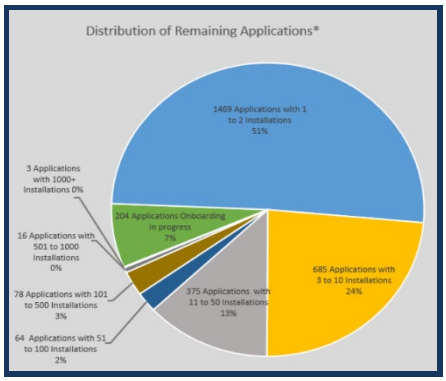
Commercial Applications in FlexNet

	September 2021	*May 2022*
Total individual installations of commercial applications	*466,000*	*719,385*
Total onboarded individual installations of commercial applications	*181,000*	*499,792*
Percent of onboarded individual installations of commercial applications	*38.8%*	*69.5%*

For the remaining approximately 219,000 (30.5%) individual installations not onboarded into FlexNet, approximately 149,000 individual installations are for 10 applications. For these 149,000 individual installations:

- *63% (representing 9 of the 10 applications) have negligible risk of over-utilization because the application licenses are either user- based, enterprise-wide, or the license installation is controlled via technical restriction.*
- *The remaining application has been prioritized for onboarding into the DTMB provided tool.*

The remaining approximately 70,000 individual installations for 2,894 applications have a limited number of installations (average of 24) per application (see the following chart). Because of the risk-based approach, these have been a lower priority for onboarding into FlexNet. Onboarding is a complex, cross functional task involving IT, Procurement, Finance, Agency staff, and limited program staff.



In Finding 2, we reported that, as of September 2021, DTMB had onboarded 181 (6%) of 3,192 commercially licensed software applications in use on State servers and workstations reporting to FlexNet. This information was derived from DTMB's tracking spreadsheet obtained during the audit that also measured FlexNet onboarding status in terms of applications. Within its response, DTMB now presents its onboarding status in terms of total installations of commercially licensed software applications as of September 2021 and May 2022. As previously noted in our auditor's comments, we cannot confirm the accuracy of the May 2022 information as it takes place outside of our review period. Also, as DTMB acknowledges in its response, the State's licensing models have various use rights that measure license compliance in terms beyond installation and FlexNet does not contain installation information for all State devices. Therefore, because DTMB could not efficiently provide documentation to support its onboarding status in terms of use rights for each commercially licensed software application or provide installation information for the other devices, we presented this information in the manner originally obtained from DTMB. We contend this presentation is not only consistent with DTMB's measurement but is also the most conservative measurement to promote general understandability for our readers. Further, DTMB's lack of documentation prevented us from evaluating the additional information presented in its onboarding status analysis, such as the level of risk or potential technical controls that may exist to mitigate this risk.

DTMB has implemented an effective process to identify and address potential over-utilization. When DTMB identifies potential over-utilization (inside or outside of FlexNet), DTMB initiates a formal review to confirm whether the over-utilization exists. DTMB's review results in a determination within 30 to 90 days and results in the mitigation.

As noted in the Audit Scope section of the report, DTMB denied our access to these records based on advice from the Department of Attorney General. Therefore, we were unable to conclude whether DTMB implemented effective processes to address potential overutilization. Because of the lack of complete inventory records and other available documentation (cited throughout our auditor's comments), we concluded DTMB's processes were likely not effective for ***all*** commercially licensed software applications in use.

DTMB reduces the risk that unrecognized or unapproved software can be installed on devices by technically preventing end-users from installing software without following the formal State processes DTMB has implemented for software installation. All requests for software installations are required to be submitted through an automated process. DTMB validates the agency has authorized the software and that the agency validated its ownership of the license. DTMB then approves the installation of the software. If the software is not recognized or approved, the software request is validated to ensure the End User License Agreement (EULA) and security standards are approved by the End-User Standards Committee (EUSC). After the software request is validated by the EUSC, it becomes recognized software. In addition, DTMB utilizes a Software Librarian to control the receipt and installation of software.

DTMB was unable to provide documentation to support these statements for our initial sample of 10 software applications. Therefore, we were unable to conclude whether this process effectively reduces the risk of unrecognized or unapproved software installations. As our finding notes, DTMB had not established processes to monitor the software identified in these categories.

Software License Management is a subcomponent of Software Asset Management (SAM) which is a subcomponent of IT Asset Management (ITAM). DTMB has implemented various ITAM and SAM processes which are the building blocks for an effective Software License Management program. DTMB established an ITAM hardware program and an ITAM Governance Board in 2015; the SAM program was formally established in 2019. As part of establishing SAM processes and controls and building the framework for a successful Software License Management program, DTMB:

- *Conducted a Lean Process Improvement (2017)*
- *Selected a vendor to implement a tool to support software license inventory tracking and management (FlexNet, 2017)*
- *Developed and implemented software request and installation processes for end-user software (2014 - current), including:*
  - *Implemented the Software Center (2014) which contains approved software that personnel are approved to install*
  - *New software purchases are tracked in an enterprise tool with details on the users/workstations receiving the software (2017)*
  - *Implemented an automated Point of Entry for End-User Software Requests (Software Direct) (2019)*
  - *Software installations requests and approvals are tracked by an Enterprise tool*
- *Developed integrations with multiple enterprise tools to discover devices containing software (2018 - current)*
- *Established and communicated Software License Management roles and responsibilities to agencies (beginning in 2018)*

- *DTMB initiated a project to ensure devices are connecting to the State network at a minimum every 30 days (2019)*
- *Developed and utilize various Software Asset Management monitoring and metric reports (early 2020 - current). These include financial, procurement, and operational metrics and reports; reconciliation reports; and software onboarding status reports.*

As noted in finding #2 subpart b, DTMB developed and implemented reconciliation processes to identify devices that do not report to FlexNet; this procedure was formally approved by management in September 2021. Due to DTMB's reconciliation process, DTMB was aware of the approximately 9,000 devices which were not reporting to FlexNet. DTMB realizes not all devices can currently report through automation to FlexNet because of business needs to isolate the devices from the State's network. According to SOM Technical Standards 1340.00.060.01 and 1340.00.060.10, State agencies including DTMB are responsible for tracking the use of software and for ensuring their inventories are accurate. Per SOM Technical Standard 1340.00.060.01, the "software license tracking can be accomplished by manual methods (e.g., simple spreadsheets) or automated methods (e.g., specialized tracking applications) depending on organizational needs", and, as such, is not required to be included within FlexNet.

DTMB's reconciliation process originally identified approximately 15,000 devices did not report to FlexNet. When we requested DTMB to confirm this number, DTMB conducted further review of each of these devices over the course of approximately 2 months of our audit to determine whether it expected the device to have commercially licensed software installed. Although this was not a standard practice within DTMB's reconciliation process, we afforded DTMB this leeway in order to present within our report the most accurate number of devices not reporting to FlexNet.

DTMB cites SOM Technical Standard 1340.00.060.01 to bolster its argument that all software licenses do not need to be inventoried within FlexNet. However, as noted in Finding 2, a centralized inventory is necessary for DTMB to monitor software licenses as 50% of the State agencies we interviewed indicated they did not maintain an inventory of software licenses outside of FlexNet. Therefore, it appears DTMB does not monitor to ensure State agencies are complying with this Standard. Further, in its response to Finding 2, DTMB agrees with the need to establish an inventory of software license information.

In fiscal year 2021, total Statewide IT expenditures were approximately $1.1 billion and total Statewide expenditures for software licensing was approximately $44.1 million (4.2%).

An accurate depiction of the range of license cost of the State's software portfolio considers that the cost of commercial licenses varies. The cost of commercial licensed software varies from very low cost for a single user or device (e.g., $4.96 per license per year) to enterprise-wide licenses. The $167,000 reference from Finding 1 was a one-time cost for a multi-year enterprise license for a mainframe. This referenced figure also included a discount which was not discussed in the audit finding.

The $100,000 cost cited in the same finding is a one-time cost for software maintenance (including security and performance updates) covering 4 years and is also related to the mainframe refresh.

In response to our audit requests, DTMB could not identify the total or average amounts it expended on software licenses. As noted in the Audit Scope section of the report, DTMB instead provided us with purchasing contracts and SIGMA financial transaction coding. Because of the noted data quality issues, we could not rely on information provided to calculate the total or average amount expended on software licenses. It appears DTMB is now able to calculate those amounts, although we are not able to attest to their accuracy given the timing of this information.

The examples cited in the finding were selected to provide report readers with some context related to the range of costs incurred by the State for software licenses.

The audit scope did not include a review of the State's processes to negotiate or achieve hard or soft cost savings. Negotiations include consideration for current license use, anticipated license use, and discounts for bulk and multi-year license purchases and tiered pricing.

Reviewing software license position within FlexNet does not always reflect a full picture regarding potential software

Our audit scope was designed to evaluate cost-saving processes in relation to sampled software applications. While DTMB states the audit scope did not consider cost-savings processes, DTMB was unable to provide us the documentation necessary to evaluate these processes for our initial sample of 10 software applications. DTMB offered to provide examples of cost savings it had achieved related

"under-utilization" when negotiated "Tiers" are not taken into consideration.

The State negotiates discounts on software purchases from the vendor's MSRP. In addition, the State generally purchases software in "Tiers" where higher volumes result in lower prices per license. This common vendor practice results in a lower price for a higher volume and enables the State to allow for future growth of the software without purchasing additional licenses on a frequent basis. DTMB Central Procurement also negotiates costs savings for software licenses when the contracts are established or up for renewal. These cost savings can be hard savings, soft savings, or cost avoidance and these savings are tracked and reported by Central Procurement. The State also purchases software maintenance (security updates, etc.) which provides for the extended use of software licenses versus buying new licenses.

to software licensing. However, assessing only the DTMB-selected examples, rather than a sample from all relevant examples, would insert bias into the audit process and not produce reliable results. To evaluate the effectiveness of DTMB's described cost savings would require a review of documentation that DTMB informed us it could not provide. Therefore, reviewing DTMB's processes without having access to relevant evidence to support their assertions would not have been an appropriate use of our audit resources.

DTMB reviewed the referenced GAO publication. This is not a relevant comparison of organization size, use of licenses, or cost savings/avoidance achieved ($82 billion in IT spending by the federal government in 2014 versus approximately $44 million annually for software licenses at the State). The reference is dated and the federal government's criteria for calculating cost avoidance is not documented and has not been compared to DTMB's criteria for the calculation for cost avoidance or hard and soft savings. DTMB's cost savings metrics were not requested or considered in this review.

Because of the lack of documentation from DTMB throughout the course of the audit, we were unable to sufficiently describe the dollar magnitude of this finding for the State. The reference to the GAO audit report is an example to provide context to readers of this report that software license management can impact cost savings for governmental agencies. Within the finding, we described the differences in budget between the two organizations. Although DTMB believes the reference is dated, we contend the GAO report demonstrates the universal and ongoing importance of software license management controls over time.

Software license management is the responsibility of all State agencies, including DTMB. SOM Technical Standard 1340.00.060.01 Configuration Management Standard states:

> *"The Agency Information System Owner will ensure the implementation and documentation of the following baseline controls: a) Uses software and associated documentation in accordance with contract agreements and copyright laws;"*

The OAG based their review on SOM Technical Standard 1340.00.060.10 Information Technology Asset Management (ITAM) Standard alone, without consideration of the State's Configuration Management Standard 1340.00.060.01 which is the overarching Standard governing the topic. Beginning in 2018, DTMB informed and trained State agencies on their responsibility to monitor software license position for their information systems. DTMB has updated the ITAM Standard to remove misinterpretation that DTMB is solely responsible for monitoring the State agencies' software license positions.

Although DTMB appears to cite this Standard to bolster its argument that State agencies are solely responsible for using software in accordance with licensing agreements, this does not change our conclusion or interpretation of the Standard cited in the finding requiring DTMB to monitor software licenses and assist agencies with compliance of software licensing agreements. Also, we contend that without enterprise-wide monitoring of software licenses through a centralized inventory, DTMB's cited mission to reduce risk and provide value will be limited. Further, as noted in Finding 3, we concluded DTMB's training provided to State agencies should be improved.

DESCRIPTION

According to ITIL, software license management is a process to ensure software licenses, license entitlements, and license usage are accurately recorded. Optimal software license management helps to minimize risks by ensuring licenses are used in compliance with software licensing agreements, licenses are cost-effectively deployed, and software acquisition and maintenance expenses are properly controlled.

Software licenses may be paid for or free and are the rights to use software. Licenses are normally required whenever externally sourced software is used, which is typically defined as being installed or executed on a device. Licenses may also be defined in enterprise terms, such as number of workstations or users, in which case a license is required for each qualifying unit or individual regardless of actual usage. Licensing models and definitions may significantly differ depending on the software application and vendor.

Software license management is the primary responsibility of DTMB's ITAM SAMO team and Procurement IT Division, in conjunction with State agencies. DTMB's IT asset management mission is to maintain an accurate inventory including configuration data of IT assets, to support all areas of DTMB infrastructure and operations plus all agency partners, to promote standard repeatable processes to reduce potential audit findings, and to optimize technical service offerings.

As of October 2021, State of Michigan workstations and servers contained approximately 3,200 commercially licensed software applications from approximately 650 software publishers.

AUDIT SCOPE, METHODOLOGY, AND OTHER INFORMATION

AUDIT SCOPE

To examine the records and processes related to DTMB's software license management. 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 the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Our audit objective and corresponding audit procedures were directed toward concluding on DTMB's software license management controls related to commercially licensed software installed on State servers and workstations and not directed toward other software or device types, such as freeware and software installed on mobile devices.

Generally accepted government auditing standards require us to report significant constraints imposed upon the audit approach. We encountered the following issues that require reporting:

- DTMB denied our access to records related to software compliance at-risk events and remediation, with the advice of the Department of Attorney General. Software compliance at-risk events occurred when DTMB determined it was potentially out of compliance with a software licensing agreement. Because DTMB shares these event records with the Department of Attorney General, the departments informed us they considered these records to be an attorney work product held in anticipation of possible litigation and providing the information for audit purposes would breach that privilege. We determined pursuing further action against DTMB to obtain historical at-risk event records would not have impacted our final conclusion and, therefore, was not an efficient use of our audit resources.

- Our planned audit procedures included an evaluation of software licensing agreements, associated purchasing and contractual records, software usage information, and software license inventory records. DTMB could not provide this information in a timely manner for our preliminary sample of 10 commercially licensed software applications. Related to these planned audit procedures, DTMB provided certain information, for which we noted the following limitations:

    - Access to FlexNet: DTMB's software license management tool contains various software

** See glossary at end of report for definition.*

license information. However, as reported in Finding 2, FlexNet was not complete. Further, without additional documentation to support the information onboarded into FlexNet, we could not verify its accuracy.

- Software licensing agreements: DTMB provided us with a repository of approximately 2,200 software licensing agreements. However, the agreements within the repository were not linked to specific software applications, thereby preventing us from reviewing the agreements for the applications specific to our sample items. Because of this limitation, we could not assess the completeness of the repository.

- Contracts and financial transactions: DTMB provided us with contracts related to the purchase of licensed software. During our review of these contracts, we were unable to isolate all purchases of specific software applications, thereby preventing us from locating the contracts for those applications specific to our sample items. Because of this limitation, we could not assess the completeness of the contracts provided. Also, DTMB provided us with the coding necessary to export relevant financial transactions from SIGMA. After extensive data analysis, we were unable to isolate those transactions specific to our sample items and determined the export contained many transactions unrelated to the purchase of licensed software that we were unable to exclude.

Based on the described limitations, we determined the software license information provided was of undetermined reliability. We were unable to effectively or efficiently conduct additional procedures to increase the reliability of this information. Because of the lack of available records and unreliability of the software license information provided, we could not complete several planned audit procedures and determined it was not cost effective to complete others. Further, we experienced several delays throughout the audit related to requests for information, meetings, and finding responses. These delays created skepticism and contributed to the undetermined reliability of the information obtained. DTMB would likely encounter the same barriers in its efforts to manage software licenses; therefore, these limitations further support our conclusion the controls in place were not sufficient.

As part of the audit, we considered the five components of internal control (control environment, risk assessment, control

activities, information and communication, and monitoring activities) relative to the audit objective and determined all components were significant.

PERIOD

Our audit procedures, which included a preliminary survey, audit fieldwork, report preparation, analysis of agency responses, and quality assurance, generally covered June 1, 2020 through April 8, 2022.

METHODOLOGY

We conducted a preliminary survey to gain an understanding of DTMB's software license management controls to establish our scope, objective, and methodology. During our preliminary survey, we:

- Reviewed State policies, standards, procedures, and best practices related to software license management.
- Interviewed DTMB management and staff and selected State agencies to obtain an understanding of software license management controls.
- Performed preliminary data analysis of FlexNet software license information and financial transactions.
- Conducted a cursory review of software licensing agreements and contracts for the purchase of licensed software.

OBJECTIVE

To assess the sufficiency of DTMB's software license management controls.

To accomplish this objective, we:

- Conducted preliminary sample planning and judgmentally sampled 10 of the 3,192 commercially licensed software applications installed on State servers and workstations that report to FlexNet as of September 1, 2021.
- Assessed the completeness of FlexNet by determining whether servers and workstations from other State IT device inventory systems report software usage information to FlexNet.
- Analyzed FlexNet data to evaluate potentially overutilized and underutilized licenses and unidentified software.

- Evaluated the sufficiency of DTMB's software license governance, including:
    - Roles and responsibilities.
    - Metrics.
    - Policies, standards, and procedures.
    - Training provided to DTMB and State agencies.

CONCLUSIONS

We base our conclusions on our audit efforts and any resulting material conditions or reportable conditions.

When selecting activities or programs for audit, we direct our efforts based on risk and opportunities to improve State government operations. Consequently, we prepare our performance audit reports on an exception basis.

AGENCY RESPONSES

Our audit report contains 3 findings and 3 corresponding recommendations. DTMB's preliminary response indicates that it partially agrees with all of the recommendations.

The agency preliminary response following each recommendation in our report was taken from the agency's written comments and oral discussion at the end of our fieldwork. Section 18.1462 of the *Michigan Compiled Laws* and the State of Michigan Financial Management Guide (Part VII, Chapter 4, Section 100) require an audited agency to develop a plan to comply with the recommendations and to submit it to the State Budget Office upon completion of an audit. Within 30 days of receipt, the Office of Internal Audit Services, State Budget Office, is required to review the plan and either accept the plan as final or contact the agency to take additional steps to finalize the plan.

GLOSSARY OF ABBREVIATIONS AND TERMS

at-risk event	When State staff have made a reasonable determination that a software application may be out of compliance with a software licensing agreement.
auditor's comments to agency preliminary response	Comments the OAG includes in an audit report to comply with *Government Auditing Standards.* Auditors are required to evaluate the validity of the audited entity's response when it is inconsistent or in conflict with the findings, conclusions, or recommendations. If the auditors disagree with the response, they should explain in the report their reasons for disagreement.
Control Objectives for Information and Related Technology (COBIT)	A framework, control objectives, and audit guidelines published by ISACA and the IT Governance Institute as a generally applicable and accepted standard for good practices for controls over IT.
DTMB	Department of Technology, Management, and Budget.
effectiveness	Success in achieving mission and goals.
efficiency	Achieving the most outputs and the most outcomes practical with the minimum amount of resources.
entitlement	The use rights, terms, and conditions associated with a license or combination of licenses.
FlexNet	DTMB's software asset management and license compliance monitoring tool.
GAO	U.S. Government Accountability Office.
IDG	Inter-Departmental Grant.
Information Technology Infrastructure Library (ITIL)	A framework, published by AXELOS, designed to standardize the selection, planning, delivery, and support of IT services to a business with a goal of improving efficiency and achieving predictable service levels.
internal control	The plan, policies, methods, and procedures adopted by management to meet its mission, strategic plan, goals, and objectives. Internal control includes the processes for planning, organizing, directing, and controlling program operations. It also

	includes the systems for measuring, reporting, and monitoring program performance. Internal control serves as a defense in safeguarding assets and in preventing and detecting errors; fraud; violations of laws, regulations, and provisions of contracts and grant agreements; or abuse.
IT	information technology.
ITAM SAMO	Information Technology Asset Management Software Asset Management Optimization.
license	The formally documented right to use software, with its associated terms and conditions.
license compliance position	Software usage compared to license entitlements.
material condition	A matter that, in the auditor's judgment, is more severe than a reportable condition and could impair the ability of management to operate a program in an effective and efficient manner and/or could adversely affect the judgment of an interested person concerning the effectiveness and efficiency of the program. Our assessment of materiality is in relation to the respective audit objective.
MMCP	Michigan Master Computing Program.
performance audit	An audit that provides findings or conclusions based on an evaluation of sufficient, appropriate evidence against criteria. Performance audits provide objective analysis to assist management and those charged with governance and oversight in using the information to improve program performance and operations, reduce costs, facilitate decision-making by parties with responsibility to oversee or initiate corrective action, and contribute to public accountability.
reportable condition	A matter that, in the auditor's judgment, is less severe than a material condition and falls within any of the following categories: a deficiency in internal control; noncompliance with provisions of laws, regulations, contracts, or grant agreements; opportunities to improve programs and operations; or fraud.
SAM	Software Asset Management.
software licensing agreement	A legal contract between a software publisher or vendor and the user of the software establishing the purchaser's right to use the

	software. It specifies in detail the rights and restrictions that apply to the use of the software.
SOM	State of Michigan.
Statewide Integrated Governmental Management Applications (SIGMA)	The State's enterprise resource planning business process and software implementation that support budgeting, accounting, purchasing, human resource management, and other financial management activities.

This Page Left Intentionally Blank

Report Fraud/Waste/Abuse

Online: audgen.michigan.gov/report-fraud

Hotline: (517) 334-8070