Office of the Auditor General
Performance Audit Report

Modernization of Legacy IT Systems
Department of Technology, Management, and Budget

September 2018

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

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.

Article IV, Section 53 of the Michigan Constitution

Performance Audit

Modernization of Legacy IT Systems

Department of Technology, Management, and Budget (DTMB)

Report Number:
071-0550-17

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According to the National Association of State Chief Information Officers (NASCIO), the modernization of legacy IT systems is a significant financial, technical, and programmatic challenge to states' ability to deliver services to citizens and conduct day-to-day business. In 2012, DTMB initiated the Michigan Legacy Application Modernization Planning (MiLAMP) methodology. MiLAMP is an enterprise portfolio management methodology that is composed of tools, templates, and processes to address all phases of the State's legacy modernization efforts. As of May 2017, 239 (16%) of the State's 1,516 information systems met DTMB's definition of legacy.

Audit Objective			Conclusion
Objective #1: To assess the effectiveness of DTMB's efforts to optimize the maturity of the State's IT investment management (ITIM) processes.			Moderately effective

Findings Related to This Audit Objective	Material Condition	Reportable Condition	Agency Preliminary Response
DTMB should continue to formalize and expand the State's ITIM program to help ensure that the State's IT investments align with strategic and business objectives, minimize risk, and maximize return on investment (ROI). These actions would help improve the State's ability to make the best use of resources by allocating them to the highest value projects (Finding #1).	X		Agrees
DTMB, in conjunction with the State Budget Office (SBO), had not fully established policies and procedures necessary to ensure that the State's ITIM practices are defined, repeatable, and consistently implemented across all State agencies for Stages 2 through 5 of the U.S. Government Accountability Office's (GAO's) ITIM Framework. Undefined processes increase the likelihood that the State's IT investment activities will be performed inconsistently, thereby producing varying results (Finding #2).	X		Agrees
DTMB and SBO had not fully implemented processes to ensure that business cases used to select IT projects for investment contained complete, accurate, and quality information to ensure that projects with the greatest business value, largest ROI, and lowest risk of failure are selected (Finding #3).		X	Agrees

Findings Related to This Audit Objective *(Continued)*	Material Condition	Reportable Condition	Agency Preliminary Response
As DTMB matures the State's ITIM program, DTMB should develop additional metrics to measure the ITIM program's impact toward improving government operations. Without additional metrics, DTMB does not have objective and accurate data to assess the impact of IT on organizational performance and determine the effectiveness of key ITIM practices over time (Finding #4).		X	Agrees

Observations Related to This Audit Objective	Material Condition	Reportable Condition	Agency Preliminary Response
If DTMB fully implemented critical Stage 2 and Stage 3 ITIM practices, it could achieve a higher stage of maturity over all IT investments. A higher level of ITIM maturity increases the likelihood that investments will have a greater ROI and better align with business needs (Observation #1).	Not applicable for observations.		

Audit Objective	Conclusion
Objective #2: To report on the status of the State's legacy systems.	Status reported

Observations Related to This Audit Objective	Material Condition	Reportable Condition	Agency Preliminary Response
An ongoing, comprehensive analysis of the State's information systems would assist in the development of strategic plans for legacy system replacement. A comprehensive analysis would provide decision-makers, including the Governor and the Legislature, with the information needed to plan for the ongoing modernization of the State's information systems (Observation #2).	Not applicable for observations.		

Doug A. Ringler, CPA, CIA
Auditor General

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September 18, 2018

Mr. David L. DeVries
Director, Department of Technology, Management, and Budget
Chief Information Officer, State of Michigan
Lewis Cass Building
Lansing, Michigan

Dear Mr. DeVries:

This is our performance audit report on Modernization of Legacy IT Systems, Department of Technology, Management, and Budget.

We organize our findings and observations by audit objective. 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 within 60 days of the date above to the Office of Internal Audit Services, State Budget Office. Within 30 days of receipt, the Office of Internal Audit Services 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
Auditor General

TABLE OF CONTENTS

MODERNIZATION OF LEGACY IT SYSTEMS

AUDIT OBJECTIVES, CONCLUSIONS, FINDINGS, AND OBSERVATIONS

IT INVESTMENT MANAGEMENT PROCESSES

BACKGROUND

An effective IT investment management (ITIM) program is necessary to ensure the success of the State's IT modernization efforts. ITIM is a process for linking IT investment decisions to an organization's strategic objectives and business plans. It provides a systematic method to minimize risks while maximizing the return on IT investments.

Two common frameworks for implementing an ITIM program are:

- The IT Governance Institute's *Enterprise Value: Governance of IT Investments, The Val IT Framework** (Val IT)
- The U.S. Government Accountability Office's* (GAO's) *Information Technology Investment Management: A Framework for Assessing and Improving Process Maturity** (ITIM Framework).

For our audit, the Department of Technology, Management, and Budget (DTMB) agreed to utilize the GAO's ITIM Framework as a benchmark for its ITIM practices.

Benefits realized from IT investment occur over a period of time and must be continually evaluated and monitored. According to the GAO, a successful ITIM process includes three interdependent phases:
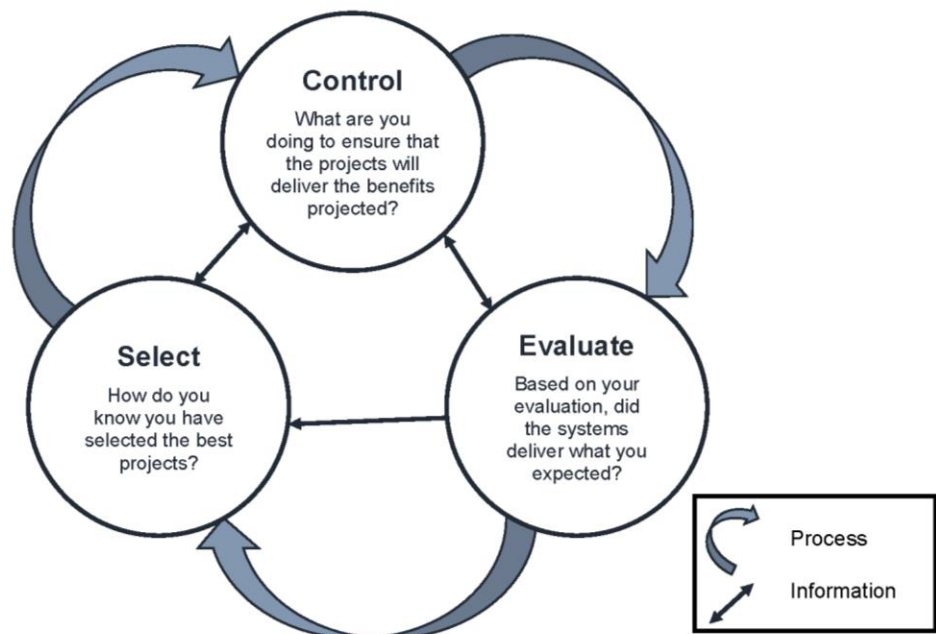
During the selection phase, an organization's decision-makers select IT projects that will best support its mission*. The goal of the selection phase is to analyze each project's risks and benefits before a significant amount of project funds are spent.

* See glossary at end of report for definition.

The selection phase also includes a review of existing IT investments; provides decision-makers with information about the investments' costs, benefits, and risks; and can be used to develop an IT retirement and replacement strategy. To facilitate State agencies' review of existing systems, DTMB created the TIME MAP process (see Exhibit #4).
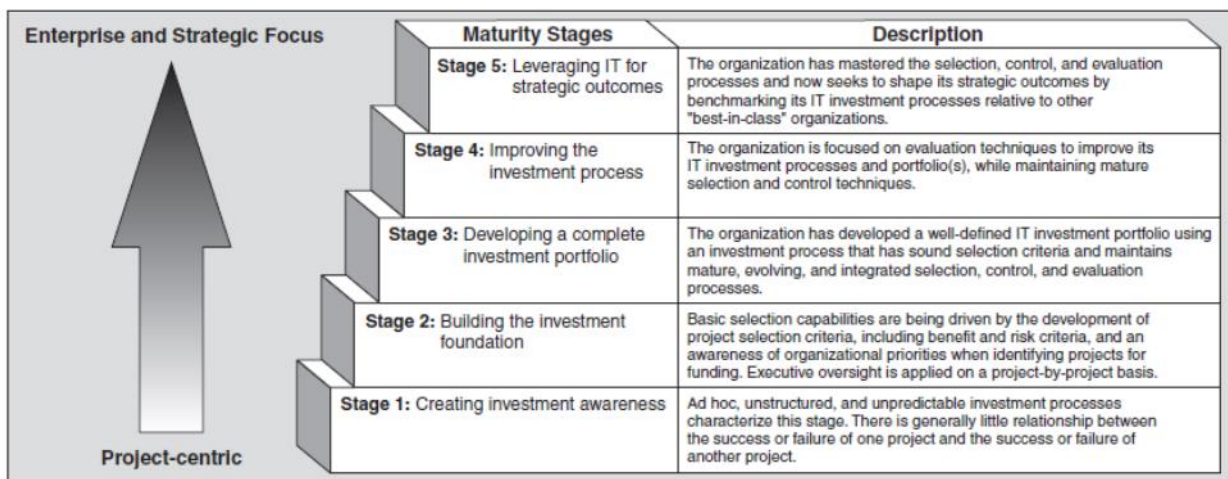
During the control phase, projects are monitored against their expected cost, schedule, and benefits so that management can take timely corrective action if a project deviates from expectations.

During the evaluate phase, actual versus expected results of implemented projects are evaluated to (1) assess the project's impact on achievement of the agency's mission, (2) identify any needed modifications to the project, and (3) revise the investment management processes based on lessons learned.

The GAO states that separate IT investment decision-making processes can exist at both the enterprise* and agency levels provided that the processes are defined, repeatable, and conducted uniformly across the organization.

The GAO's ITIM Framework is a tool that an organization can use to evaluate the maturity of its ITIM program. The ITIM Framework is composed of five maturity stages*. Each stage builds upon the lower stages and enhances an organization's ability to manage its IT investments.

The GAO's five maturity stages are:

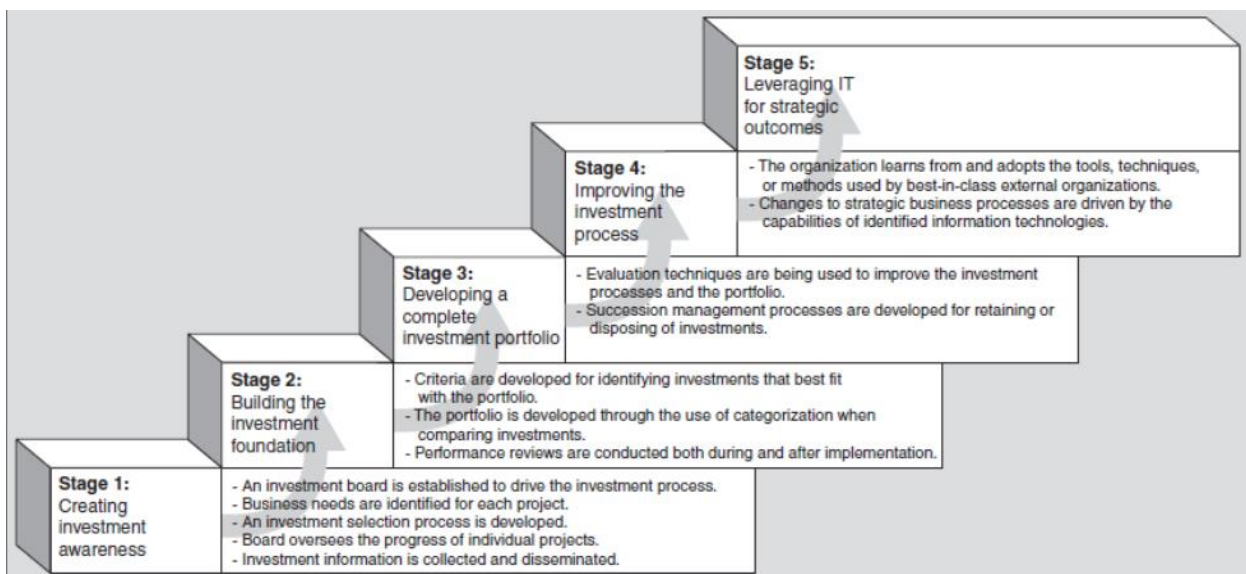| Enterprise and Strategic Focus	Maturity Stages	Description
	Stage 5: Leveraging IT for strategic outcomes	The organization has mastered the selection, control, and evaluation processes and now seeks to shape its strategic outcomes by benchmarking its IT investment processes relative to other "best-in-class" organizations.
	Stage 4: Improving the investment process	The organization is focused on evaluation techniques to improve its IT investment processes and portfolio(s), while maintaining mature selection and control techniques.
	Stage 3: Developing a complete investment portfolio	The organization has developed a well-defined IT investment portfolio using an investment process that has sound selection criteria and maintains mature, evolving, and integrated selection, control, and evaluation processes.
	Stage 2: Building the investment foundation	Basic selection capabilities are being driven by the development of project selection criteria, including benefit and risk criteria, and an awareness of organizational priorities when identifying projects for funding. Executive oversight is applied on a project-by-project basis.
Project-centric	Stage 1: Creating investment awareness	Ad hoc, unstructured, and unpredictable investment processes characterize this stage. There is generally little relationship between the success or failure of one project and the success or failure of another project.

Source: GAO

See glossary at end of report for definition.

According to the ITIM Framework, an organization may concurrently implement key practices that are associated with several maturity stages. Key practices associated with higher stage critical processes are frequently initiated while the organization, as a whole, is at a lower stage of maturity. However, an organization's level of maturity is determined by assessing at what maturity stage the organization has implemented all of the key practices for the current and lower level stages. For example, performing key practices for only some Stage 3 critical processes does not mean that the organization has attained Stage 3 maturity.

The following chart identifies critical steps that organizations must accomplish to move to the next maturity stage:

Stage 5:
Leveraging IT for strategic outcomes

Stage 4:
Improving the investment process
- The organization learns from and adopts the tools, techniques, or methods used by best-in-class external organizations.
- Changes to strategic business processes are driven by the capabilities of identified information technologies.

Stage 3:
Developing a complete investment portfolio
- Evaluation techniques are being used to improve the investment processes and the portfolio.
- Succession management processes are developed for retaining or disposing of investments.

Stage 2:
Building the investment foundation
- Criteria are developed for identifying investments that best fit with the portfolio.
- The portfolio is developed through the use of categorization when comparing investments.
- Performance reviews are conducted both during and after implementation.

Stage 1:
Creating investment awareness
- An investment board is established to drive the investment process.
- Business needs are identified for each project.
- An investment selection process is developed.
- Board oversees the progress of individual projects.
- Investment information is collected and disseminated.

Source: GAO

According to the GAO, achievement of more mature ITIM stages depends on instituting good management practices in areas such as strategic planning*, project management, enterprise architecture* (EA) management, human capital management, and IT procurement. The ITIM Framework does not include criteria for evaluating these related practices.

AUDIT OBJECTIVE

To assess the effectiveness* of DTMB's efforts to optimize the maturity of the State's IT investment management processes.

CONCLUSION

Moderately effective.

See glossary at end of report for definition.

FACTORS IMPACTING CONCLUSION

- DTMB has implemented or partially implemented many ITIM practices.

- DTMB has achieved a higher level of maturity over IT Investment Fund (ITIF) projects (Exhibit #3).

- Two material conditions* related to formalizing and expanding the ITIM program and fully establishing IT investment policies and procedures (Findings #1 and #2).

- Two reportable conditions* related to improved business cases and additional ITIM program metrics (Findings #3 and #4).

- Observation* regarding fully implementing critical Stage 2 and Stage 3 ITIM practices (Observation #1).

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

FINDING #1

Expanded ITIM program needed.

DTMB should continue to formalize and expand the State's ITIM program to help ensure that the State's IT investments align with strategic and business objectives, minimize risk, and maximize return on investment* (ROI). These actions would help improve the State's ability to make the best use of resources by allocating them to the highest value projects.

Based on our review of the best practices identified in the GAO's ITIM Framework and related GAO guidance, DTMB should:

a. Adopt an ITIM framework and maturity level for the State.

Framework needed to assess maturity of ITIM program.

Adopting a framework, such as the ITIM Framework or Val IT, would provide DTMB with a method for assessing how well the State manages its IT resources. Establishing a maturity level would help DTMB evaluate the state of its current processes and identify opportunities for process improvement.

b. Fully establish an enterprise IT investment board* responsible for defining, implementing, and monitoring the State's IT investment governance process.

To align with best practices, the board should include the State's Chief Information Officer, the State Budget Director, and senior executives from State agencies.

The GAO states that, for organizations where state agencies share responsibility for IT investment activities (as is done in Michigan), agency-based investment boards can be established. However, the enterprise IT investment board must maintain the ultimate responsibility for lower level investment board activities. As such, the enterprise investment board should clearly define the roles, responsibilities, and criteria for determining the types of projects that will be reviewed at the different organization levels.

In January 2017, DTMB approved charters for its IT governance structure. Accordingly, the IT Strategy Group and IT Steering Committee have various enterprise IT investment board responsibilities, such as ensuring that technology services deliver business value and that expected benefits from investments are fully realized. In addition, the IT Steering Committee is responsible for providing oversight of the annual Call for Projects* process (see Exhibit #5) and managing DTMB's portfolio of enterprise investments.

However, our review disclosed that the IT Strategy Group and IT Steering Committee did not:

- Fully define roles and responsibilities for IT investment processes.

See glossary at end of report for definition.

- Fully establish criteria, policies, procedures, and best practices for selecting, controlling, and evaluating IT investments.

- Monitor and evaluate the implementation of ITIM processes.

- Measure and report on the effectiveness of the State's IT investments.

- Provide oversight of IT investments that affect multiple departments, involve common infrastructure, are high cost or high risk, or have significant scope or duration. DTMB informed us that the IT Strategy Group reviewed the status of enterprise projects on an informal basis and was developing guidance to determine the cadence for future periodic reviews.

c. Develop a written IT investment process guide tailored to the State's organizational structure.

   According to the ITIM Framework, a process guide should be the key authoritative document to manage IT investment processes and provide a comprehensive foundation for related policies and procedures. For example, the guide should specify State agencies' authority and responsibilities for IT investment decisions as well as the authority and responsibilities retained by DTMB. The guide should also specify how IT investment-related processes will be coordinated with other processes, such as strategic planning, budgeting, and EA management.

d. Develop a business case and other project documentation to implement improvements in enterprise and agency IT investment processes.

   The State's Project Management Methodology (PMM) provides guidance for preparing planning documents that, when followed, will increase the likelihood that key stakeholders* understand and support an enterprise investment management program.

e. Provide initial and ongoing training tailored to the various groups responsible for performing ITIM activities once an ITIM framework has been formally adopted.

We consider this finding to be a material condition because strengthening ITIM governance would help DTMB mature the State's ITIM processes. A higher level of maturity would improve IT investment decisions made by DTMB and State agencies. For example, implementing a structured methodology with appropriate

See glossary at end of report for definition.

oversight would help DTMB and State agencies ensure that the State's IT resources are allocated to those investments that maximize benefits and improve operations while minimizing risk and costs.

RECOMMENDATION   We recommend that DTMB continue to formalize and expand the State's ITIM program to help ensure that the State's IT investments align with strategic and business objectives, minimize risk, and maximize ROI.

AGENCY PRELIMINARY RESPONSE   DTMB provided us with the following response:

DTMB agrees with the recommendation. DTMB recognizes the importance of continuous improvement of the State's IT investment program and will continue to refine and mature existing processes. Since completion of audit field work, DTMB has addressed the five best practices identified in the finding. Specifically:

a. *DTMB reviewed the GAO's ITIM framework and the IT Governance Institute's VAL IT framework, and adopted VAL IT as a better fit with other SOM frameworks such as COBIT and the Capability Maturity Model Integrated (CMMI). The DTMB IT Steering Committee formally adopted Val IT as the SOM investment management framework on February 18, 2018. Full implementation of the framework is an ongoing process.*

b. *DTMB established an enterprise IT Investment Management Board in May 2018. Membership includes representatives from DTMB, SBO, Department of Health and Human Services, Department of Treasury, Department of Natural Resources, Michigan Department of Transportation, and the Civil Service Commission. The purpose of the Board is to define the end-to-end process of soliciting projects, defining eligibility criteria, selecting project candidates for inclusion, and providing executive oversight of the following projects:*

   • *All projects chosen to be included in the ITIF portfolio. These projects are specifically designated to receive funding from ITIF as designated by Public Act 207 of 2018 Section 814. The scope of these projects is focused on legacy application replacement and technical infrastructure improvement. They may be enterprise or agency level projects.*

   • *All projects chosen to be included in the Enterprise Information Technology (EIT) portfolios. Projects in this*

category include all non-ITIF projects that meet the following criteria:

- o *Common solutions that:*

  - ▪ *Support Statewide or multi-agency business processes or*

  - ▪ *Provide new or significantly enhanced technical infrastructure capability.*

- o *Are not routine product or infrastructure upgrades (e.g., Microsoft Windows, Oracle Database).*

- o *Are new initiatives for fiscal year 2019 and later.*

The IT Investment Management Governance Board acts as an advisory board that provides ITIF and EIT funding recommendations to both the SBO and DTMB Directors.

c. *The DTMB Enterprise Portfolio Management Office (EPMO) is leading an initiative to expand the SUITE framework to include not only existing guidance for project management and systems engineering, but also investment management, value governance, and portfolio management. A new overarching policy with 5 standards and related procedures will be housed in the State Administrative Guide. The updated draft policy and standards will be circulated among agencies for their impact analysis by October 15, 2018.*

d. *Improvements to the existing Call for Projects process are in development and will be implemented in the new Project Portfolio Management (PPM) tool beginning in October 2018. Prior to initiating the procurement process for a PPM tool, the EPMO completed a business case that included ROI analysis and a benefits register. EPMO will follow the SOM project management methodology to implement the new tool, including creation of project documentation.*

e. *The DTMB EPMO developed and currently delivers training on candidate creation, Call for Projects, and benefits realization. EPMO already has a comprehensive SUITE training program that will be updated to include investment management to coincide with publication of the updated overarching policy and investment management standard. EPMO will develop and implement initial and ongoing training related to IT investment management.*

FINDING #2

Additional IT investment policies and procedures needed.

DTMB, in conjunction with SBO, had not fully established policies and procedures necessary to ensure that the State's ITIM practices are defined, repeatable, and consistently implemented across all State agencies for Stages 2 through 5 of the GAO's ITIM Framework.

Well-defined policies and procedures are an indication of an organization's maturity. They provide a basis for an organization to analyze how to progress from its existing to its desired maturity level and can help identify process gaps and improvement opportunities. Policies and procedures also communicate management's expectations and provide the means to effectively control and monitor the State's IT processes.

Ensuring defined, repeatable processes would improve the reliability of information that senior leadership, including the Governor and the Legislature, use when selecting, controlling, and managing the State's IT investments. Because each State agency has its own unique IT governance structure and internal processes for managing its IT investments, documented policies and procedures are needed to formally communicate DTMB's and SBO's expectations for agency ITIM practices.

DTMB and SBO have implemented, or are in the process of implementing, many key IT investment practices recommended in the GAO's ITIM Framework. Examples of these processes include DTMB's annual Call for Projects and project management processes, as well as SBO's budget request process for which SBO has issued documented instructions. Also, DTMB's PMM contains documented procedures related to key IT investment practices, such as providing project management oversight, capturing investment information, and conducting post-implementation reviews. In addition, DTMB issued procedures for ITIF project governance.

Undefined processes increase the likelihood that the State's IT investment activities will be performed inconsistently, thereby producing varying results.

Complete policies and procedures for each stage of the ITIM Framework should be developed.

DTMB and SBO had not developed policies and procedures related to:

a. Stage 2: Building the Investment Foundation.

- Directing each investment board's operations.

- Ensuring that IT projects or systems support ongoing business needs.

- Selecting new IT proposals.

- Updating information about existing systems.

- Reselecting ongoing IT investments.

b. Stage 3: Developing a Complete Investment Portfolio.

- Creating and modifying IT portfolio selection criteria*.

- Analyzing, selecting, and maintaining the investment portfolios.

- Reviewing, evaluating, and improving the performance of the portfolios.

c. Stage 4: Improving the Investment Process.

- Evaluating and improving the performance of the investment portfolios.

- Managing the IT succession* process.

d. Stage 5: Leveraging IT for Strategic Outcomes.

- Improving the ITIM process using benchmarking*.

- Conducting IT-driven strategic business change activities.

We consider this finding to be a material condition because maturity models* such as the ITIM Framework and Val IT require documented policies and procedures for the State to advance from lower levels to higher levels of maturity.

RECOMMENDATION

We recommend that DTMB, in conjunction with SBO, fully establish policies and procedures necessary to ensure that the State's ITIM practices are defined, repeatable, and consistently implemented across all State agencies for Stages 2 through 5 of the GAO's ITIM Framework.

AGENCY PRELIMINARY RESPONSE

DTMB provided us with the following response:

DTMB agrees with the recommendation. DTMB and SBO have already established foundational processes and recognize the need to continue to strengthen and broaden that base. Specifically, SBO revised instructions for the budget development process in August 2018 that further document and align DTMB's complementary call for projects process with budgetary requests identifying IT resource needs. In concert with adopting the Val IT framework, DTMB has started to implement Technology Business Management (TBM), a leading commercial and federal/state framework of standards and best business practices for relating business value for IT investments, and to deliver innovation for the organization. Key benefits of TBM include alignment of budget and resource plans to strategic business priorities, budget and spending transparency, and portfolio optimization.

* See glossary at end of report for definition.

Additionally, DTMB and SBO are working collaboratively as members of a workgroup which is developing standard investment management processes that align with VAL IT. These standard processes will be incorporated into SUITE to ensure compliance across all SOM departments. The workgroup is scheduled to complete its work by December 31, 2018.

FINDING #3

Processes needed to improve business cases.

DTMB and SBO had not fully implemented processes to ensure that business cases used to select IT projects for investment contained complete, accurate, and quality information to ensure that projects with the greatest business value, largest ROI, and lowest risk of failure are selected.

A well-developed, quality business case is one of management's most valuable tools for selecting its IT investments. A business case contains facts and supporting details that IT investment boards use to evaluate competing IT projects. The GAO recommends that organizations perform business case analysis as part of an unbiased IT investment selection process and that selection processes specify the level and types of business case analysis to be conducted based on a proposed project's size and risk.

In addition, best practices recommend that investment boards utilize business case information to manage IT investments throughout their economic life cycles. As such, the GAO recommends that organizations ensure that a project's business case is periodically reviewed and updated to reflect changes in scope, schedule, and budget so that the board can evaluate whether expected project benefits were realized.

We compared DTMB's business case template (i.e., the Changepoint candidate form) with GAO best practices and noted that DTMB's template appropriately included the information recommended by the GAO.

We reviewed business cases for 38 projects with projected start dates in fiscal years 2016 and 2017. In addition, we requested documentation to support the projects' ROI and total cost of ownership* (TCO) calculations for 8 judgmentally selected projects. Our review disclosed that DTMB did not:

a. Assign responsibility and establish processes for validating the completeness, accuracy, and reliability of key business case information.

According to the GAO, an organization should establish a group or audit function that is responsible for verifying and validating information submitted as part of the business case. The GAO recommends that organizations establish flexible but defined rules for project review and approval based on the projects' costs, benefits, and risks.

We noted:

28 (74%) of 38 business cases reviewed did not document alignment with an SOM IT goal.

(1) Business cases did not include all required data. Of the 38 business cases reviewed:

(a) 28 (74%) did not document the project's alignment with an SOM IT goal.

See glossary at end of report for definition.

(b) 25 (66%) did not identify DTMB service areas that would support the proposed project.

(c) 20 (53%) did not document the project's alignment with an agency goal.

(d) 18 (47%) had an incomplete risk assessment.

(e) 10 (26%) did not have calculations such as ROI and TCO.

(f) 9 (24%) did not have budget information such as State resource costs, contractor costs, or non-labor costs.

(g) 2 (5%) did not describe the work to be performed.

All 8 projects lacked documentation for ROI and TCO.

(2) For the 8 projects, documentation was not maintained to support key business case information. As a result, DTMB was unable to provide documentation of ROI and TCO calculations.

Ensuring that business cases contain complete, accurate, and reliable data will help improve the quality of IT decisions by ensuring that objective data is considered along with other subjective factors.

b. Fully align business cases with documents used in related processes, such as funding requests and Enterprise Architecture Solution Assessments* (EASAs). For example:

(1) DTMB and SBO did not require State agencies to reference related business cases when submitting funding requests for new projects. SBO's proposal for change form was not specifically designed for IT requests and, therefore, did not require IT requests to identify related business cases.

(2) DTMB did not have an efficient mechanism to ensure that it prepared EASAs for all projects, when required. According to the GAO's ITIM Framework, only investments that move an organization to its target architecture should be approved, unless a waiver is obtained or the EA is modified. SOM Technical Standard 1345.00.80 requires that an EASA be prepared for any SOM IT activity that involves the development, installation, or use of software, hardware, or network components by the end of the requirements definition phase. In addition, for IT projects

See glossary at end of report for definition.

involving the procurement process, an EASA must be submitted with the vendor proposal.

Because of inconsistencies between project names, business cases (Changepoint candidates), and EASA titles, we were unable to determine which projects required EASAs and were unable to trace the names of the projects to DTMB's EASA listing.

c. Develop additional guidance to ensure complete and consistent ROI and TCO calculations across State agencies. Specifically:

(1) DTMB and State agencies informed us that a need exists for additional guidance to assist in ROI calculations. In addition, they indicated that ROI is difficult to calculate for projects that are the result of a legislative mandate or that have benefits that are not easily quantifiable. According to best practices for calculating ROI in the public sector, guidance should specify that risk, feasibility, long-term goals, and other agency-specific factors be considered. Additional guidance would help DTMB and SBO ensure that ROI calculations are uniformly calculated.

(2) SBO's instructions for preparing funding requests did not include sufficient examples of costs that agencies should consider when calculating an investment's TCO. The instructions included costs primarily related to the acquisition phase. Examples of other operational, support, and retirements costs that should be considered include patching, enhancements, help desk, training, backup and disaster recovery, and data archiving.

RECOMMENDATION

We recommend that DTMB and SBO fully implement processes to ensure that business cases used to select IT projects for investment contain complete, accurate, and quality information to ensure that projects with the greatest business value, largest ROI, and lowest risk of failure are selected.

AGENCY PRELIMINARY RESPONSE

DTMB provided us with the following response:

DTMB agrees with the recommendation. The DTMB EPMO has developed a detailed candidate project user guide. DTMB is developing a process to monitor candidate project data and measure required completion to ensure that data is populated in the enterprise PPM tool. As noted in the response to Finding #2, DTMB and SBO are working together to fully integrate candidates, business cases, and budget requests. SBO will revise its budget development instructions to ensure consistent

presentation of a business case for candidate projects from initial inception during the SOM Call for Projects through resource requests during the budget development process. SBO will provide additional direction regarding agency ROI and TCO calculations.

FINDING #4

Additional ITIM program metrics needed.

As DTMB matures the State's ITIM program, DTMB should develop additional metrics to measure the ITIM program's impact toward improving government operations. Without additional metrics, DTMB does not have objective and accurate data to assess the impact of IT on organizational performance and determine the effectiveness of key ITIM practices over time.

The GAO's *Executive Guide: Measuring Performance and Demonstrating the Results of Information Technology Investments* describes best practices for developing IT performance metrics. According to the Executive Guide, successful organizations follow a common approach for measuring the effectiveness of their IT investments. Specifically, the organizations defined clear missions and desired outcomes; measured performance to gauge progress; and used the performance information as a basis for decision-making.

The Executive Guide includes examples of four common IT goals and related metrics to measure IT investment results. We assessed DTMB's metrics related to how well IT investments, as a whole, help achieve strategic objectives. One goal identified 10 metrics related to enterprise mission goals, portfolio analysis and management, and financial and investment performance. For 7 of the metrics, DTMB did not fully develop measurements to evaluate the effectiveness of IT investments from an enterprise perspective.

To effectively evaluate the State's ITIM program, DTMB should customize its investment metrics to align with its level of ITIM maturity as well as enterprise IT and business objectives.

The following table presents objectives and metrics suggested by the GAO's Executive Guide and whether the measure is utilized by DTMB:

Objective	GAO Recommended Measurement	Did DTMB periodically evaluate and report on the measurement?	
Enterprise mission goals	• Percent of mission improvements (cost, time, quality) attributable to IT solutions and services	Partially	DTMB provided us with documentation of metrics related to improving its service delivery to State agencies. The metrics measure DTMB's progress in implementing its initiatives. In addition, DTMB established goals and metrics related to several enterprise initiatives, such as single sign-on, cloud computing, and mobile applications. However, additional metrics are needed to measure improvements in business processes attributable to IT solutions and services.
	• Percent of planned IT benefits projected versus realized	Partially	DTMB informed us that it measures benefits realized for ITIF projects. Beginning in fiscal year 2017, DTMB began evaluating benefits realized for all projects over $1.0 million. DTMB informed us that it measures benefits realized for three years after implementation. However, DTMB has not developed metrics to evaluate the percentage of actual benefits realized on a portfolio basis.
Portfolio analysis	• Percent of IT portfolio reviewed and disposed	Partially	DTMB informed us that State agencies annually review their IT portfolios using the TIME model to assist in identification of information systems to be modernized or replaced. In addition, DTMB provided documentation of its prioritization and planned project dates for approved and proposed IT projects. However, DTMB had not established metrics related to these activities.
	• Percent of old applications retired	Partially	DTMB tracks the number of legacy systems retired, replaced, or modernized through ITIF. On an enterprise basis, DTMB tracks data about its IT projects, including the number of completed projects and related cost and schedule information. However, DTMB's metrics did not explicitly track the number of applications retired.
	• Percent of applications retirement plan achieved	No	DTMB informed us that it is working to improve application retirement plans.
	• Percent of reusable core application modules	No	DTMB indicated that management had not requested data for this metric, and does not believe that the metric is applicable for the State's environment.
	• Percent of new IT investments compared to total spending	Yes	Gartner calculated this measurement in 2012 and 2017.
Financial and investment performance	• Percent and cost of services provided in-house versus industry standard	Yes	Gartner calculated this measurement in 2012 and 2017.
	• IT budget as a percent of operational budget compared to industry average	Yes	Gartner calculated this measurement in 2012 and 2017.
	• Net present value, internal rate of return, return on investment, return on net assets	Partially	State agencies are required to calculate ROI for proposed projects. ROI calculations are used to determine whether a project's benefits were realized. However, DTMB had not established metrics to assess this data from an enterprise perspective.

The GAO recommends that organizations with various levels of responsibility for IT investments establish performance metrics for each level of decision-making responsibility. As such, DTMB should establish guidance to ensure that State agencies capture the data needed for DTMB to assess the State's IT investments from an enterprise-wide perspective.

RECOMMENDATION

We recommend that DTMB develop additional metrics to measure the ITIM program's impact toward improving government operations.

AGENCY PRELIMINARY RESPONSE

DTMB provided us with the following response:

DTMB agrees with the recommendation and recognizes the need for the State of Michigan to continue moving up the maturity scale in its IT investment management program. Given the State's current basic maturity level, current metrics meet expectations and management needs. As the State continues to mature its investment management processes and implements the Val IT framework and TBM, metrics will be revised accordingly.

OBSERVATION #1

DTMB should fully implement critical Stage 2 and Stage 3 ITIM practices.

If DTMB fully implemented critical Stage 2 and Stage 3 ITIM practices, it could achieve a higher stage of maturity over all IT investments.
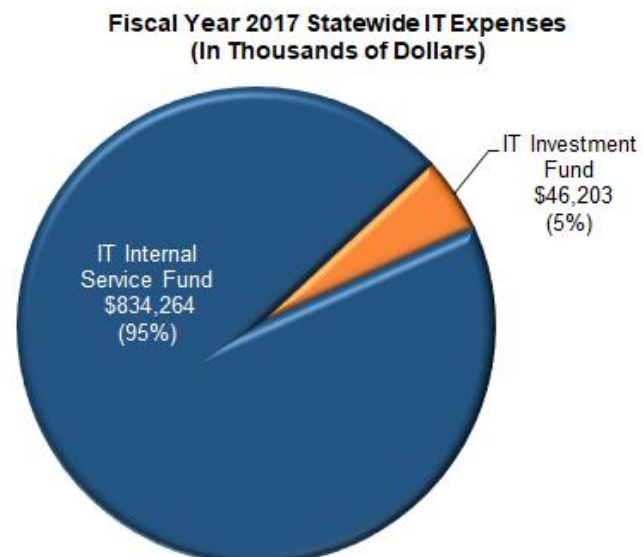
We mapped DTMB's ITIM practices as of September 30, 2017 to the GAO's ITIM Framework. Our review disclosed:

a. A significant opportunity exists for the State to improve the overall performance of its IT investments by increasing the maturity of its processes over non-ITIF projects. DTMB implemented more Stage 2 and Stage 3 practices for ITIF projects than non-ITIF projects. This higher level of maturity can be attributed to a documented governance model that defines roles, responsibilities, and procedures for ITIF projects. Specifically, the ITIF governance model included procedures for critical processes related to project assurance, budget and cost control, and benefits realization.

Other factors contributing to more mature ITIM practices and improved oversight for ITIF projects include:

- Funding for ITIF projects is appropriated to DTMB.

- Allocation of ITIF funds to conduct project assurance activities.

- Quarterly status reporting to the Legislature.

A higher level of ITIM maturity over ITIF projects increases the likelihood that ITIF investments will have a higher ROI and better align with business needs than non-ITIF investments. The following chart identifies ITIF project spending in relation to the State's nearly $834 million of IT expenses for fiscal year 2017 as recorded in the State's Information Technology Fund:

Fiscal Year 2017 Statewide IT Expenses
(In Thousands of Dollars)

IT Investment Fund $46,203 (5%)

IT Internal Service Fund $834,264 (95%)

b. As noted in the following table, DTMB executed key ITIM practices at all stages of the ITIM maturity model; however, it executed only 50% and 37% of the Stage 2 and Stage 3 key practices, respectively, for non-ITIF investments:

	Number of Key Practices	ITIF						Non-ITIF					
		Executed		In Progress		Not Executed		Executed		In Progress		Not Executed	
Stage 2	38	27	71%	9	24%	2	5%	19	50%	15	39%	4	11%
Stage 3	27	21	78%	5	19%	1	4%	10	37%	14	52%	3	11%
Stage 4	15	3	20%	10	67%	2	13%	3	20%	9	60%	3	20%
Stage 5	13	3	23%	5	38%	5	38%	3	23%	5	38%	5	38%

See Exhibit #3 for an expanded comparison of key ITIM practices.

According to the GAO, it is common for organizations to concurrently implement key practices associated with several maturity stages as well as to initiate higher level processes when the organization as a whole is at a lower state of maturity. However, an organization cannot fully achieve the benefits of higher stages of maturity until it successfully implements and institutionalizes lower stage activities. As such, DTMB should focus its efforts on fully implementing key activities at the project level (Stage 2) and portfolio level (Stage 3).

STATUS OF THE STATE'S LEGACY SYSTEMS

BACKGROUND

There are many ways to define a legacy system*. Most definitions consider the system's age; however, age is not the only factor. Other characteristics of legacy systems include whether the system meets business needs, availability of hardware and software support, and ability to expand or upgrade the system.

According to DTMB, "Legacy is defined as applications, systems, technologies, and solution/security architectures that are using sunset, frozen, unsupported, or deprecated technologies as defined by DTMB Policies and Standards and the EA Technology Roadmap." The EA Technology Roadmaps* define the lifecycle for IT technologies authorized for the State of Michigan (SOM) IT environment. A system is considered legacy if it has a component that is no longer used in the SOM environment or if a component's vendor no longer provides maintenance or support.

Annually, DTMB and State agencies assess various business and IT characteristics about the State's information systems. Information about the systems is entered into Changepoint*, DTMB's enterprise project and portfolio management tool. The resulting TIME (Tolerate, Invest, Migrate, Eliminate) analysis is used by DTMB and State agencies to identify information systems, including legacy systems, that, if replaced or modernized, would provide the greatest value to business operations. For more information about TIME analysis, see Exhibit #4.

AUDIT OBJECTIVE

To report on the status of the State's legacy systems.

CONCLUSION

Status reported.

FACTORS IMPACTING CONCLUSION

- Observation regarding ongoing analysis needed for legacy systems (Observation #2).

- Exhibit #1 presents a comparison of the oldest systems and the systems with the greatest ROI if replaced, as reported by the agencies.

- Exhibit #2 presents 12 legacy system profiles.

* See glossary at end of report for definition.

OBSERVATION #2

**Ongoing analysis
needed for legacy
systems.**

An ongoing, comprehensive analysis of the State's information systems would assist in the development of strategic plans for legacy system replacement. Legacy system replacement and business modernization efforts require continuous planning.

A comprehensive analysis that considers both enterprise and agency perspectives would provide decision-makers, including the Governor and the Legislature, with the information needed to plan for the ongoing modernization of the State's information systems.

A system that is not considered legacy this year might become so next year because of changes in technology, availability of technical support, or changing business needs. A comprehensive analysis would help DTMB and State agencies to:

- Develop a complete list of existing legacy systems as well as those systems approaching legacy status.

- Plan for replacement activities, such as business case* development, business process lean process improvement* (LPI), and procurement request for information*.

- Identify strategies to mitigate security and other risks posed by legacy systems.

- Develop immediate and mid-range (2 to 3 years) funding estimates.

- Realize efficiencies and cost savings by further standardizing technology platforms, migrating legacy systems to shared services or enterprise solutions, or establishing master contracts, when appropriate.

- Identify systems suitable for one of DTMB's modernization strategies, such as Cloud First or Mobile First.

See glossary at end of report for definition.

The following chart depicts the status of the State's 1,516 systems documented in Changepoint:

Legacy Status of IT Systems as of May 2017

239 (16%)

437 (29%)

840 (55%)
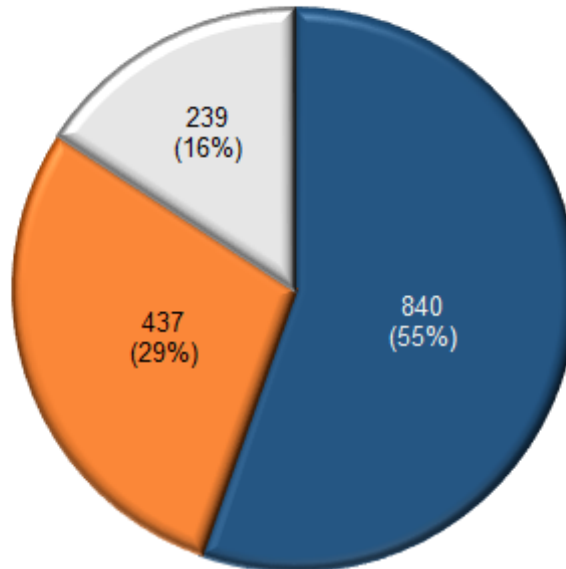
■ System is on the EA Technology Roadmaps (Not Legacy).

■ System is on the EA Technology Roadmaps but will be sunsetting or approaching end of life (Approaching Legacy).

■ System is not on the EA Technology Roadmaps (Legacy).

Legacy systems are more vulnerable from a security perspective.

Because legacy systems often use unsupported or outdated technology, they are more vulnerable from a security perspective as well as more difficult and expensive to maintain. Other limitations of legacy systems include an increased likelihood of unmet business needs and inadequate access to information used for decision-making and reporting.
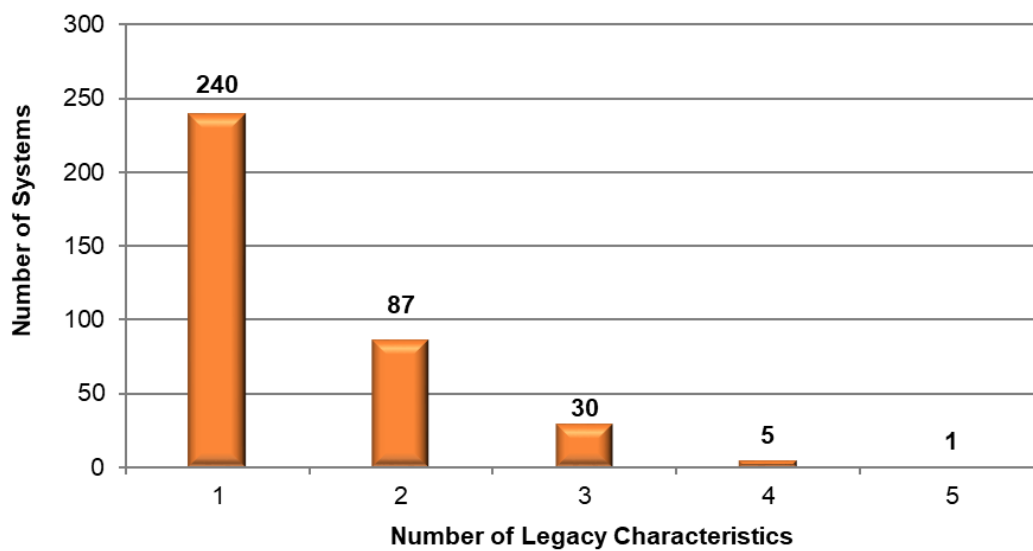
Our review disclosed:

a. A significant number of systems, although not currently meeting the definition of legacy, have one or more legacy characteristics:

Information Systems Not Defined as Legacy With One or More Legacy Characteristics
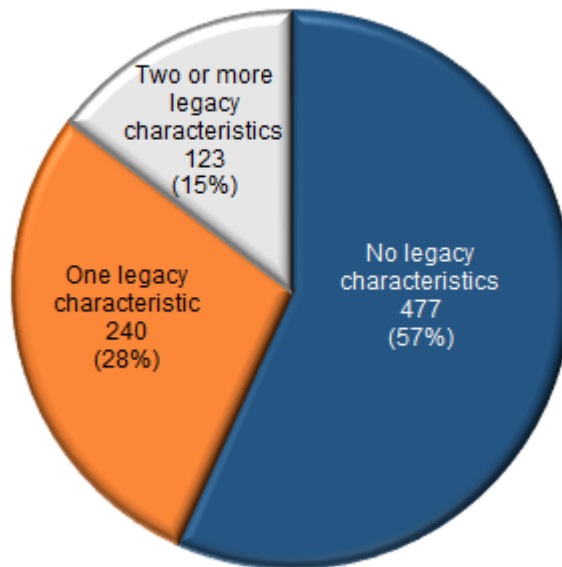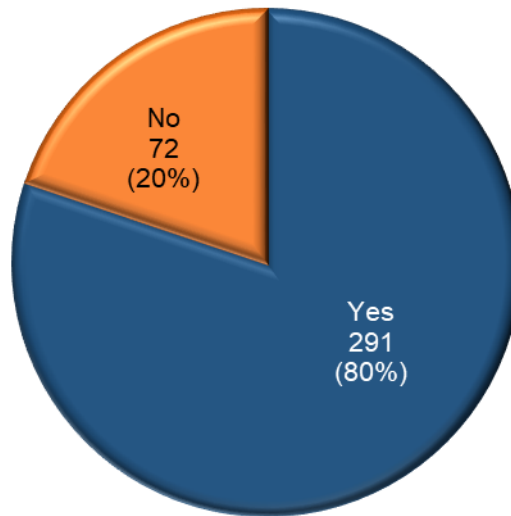

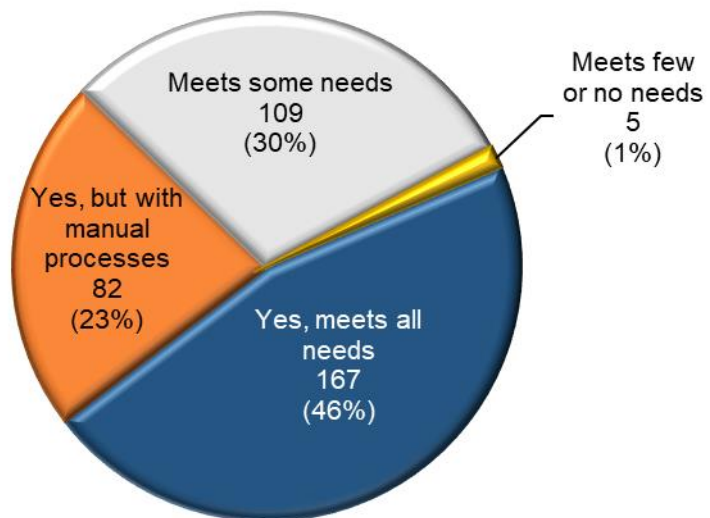**Information Systems With Legacy Characteristics**

The following five charts depict State agencies' Changepoint data for the 363 systems having legacy characteristics:

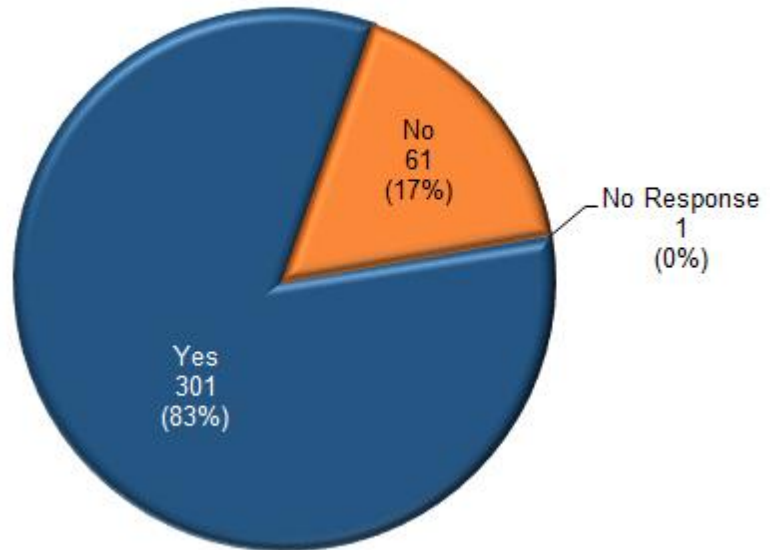## Are There Enough Skilled Developers in the Marketplace to Support the System?

No
72
(20%)

Yes
291
(80%)

Does the System Meet Business Needs?

Meets some needs
109
(30%)

Meets few
or no needs
5
(1%)

Yes, but with
manual
processes
82
(23%)

Yes, meets all
needs
167
(46%)

Does the System Comply With SOM Data Security Requirements?

No
61
(17%)

No Response
1
(0%)

Yes
301
(83%)

Scalability: Can the System Expand Without Technical Complexity and/or Significant Cost?

21
(6%)

44
(12%)

54
(15%)

244
(67%)
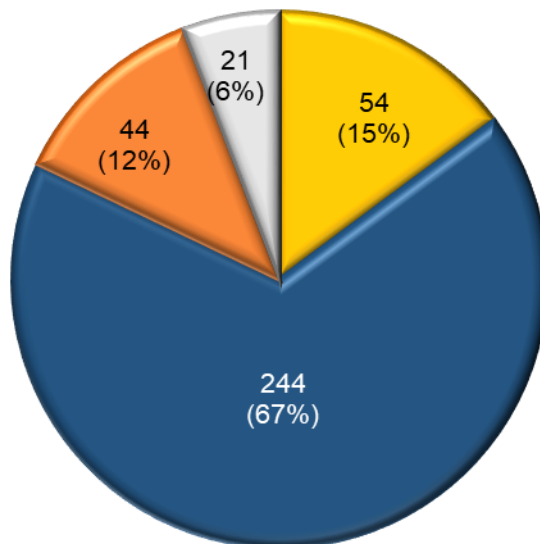
■ The application is scalable to go beyond currently anticipated requirements without any technical complexity/cost.

■ The application is scalable to meet current business requirements with minor technical complexity/cost.

■ The application is scalable, but not sufficiently to meet current business requirements without significant complexity.

■ The application cannot be expanded beyond its current size.

Functional Adaptability: Can the System Accommodate Changes or Enhancements Without Technical Complexity and/or Significant Cost?

34
(9%)

146
(40%)

183
(51%)
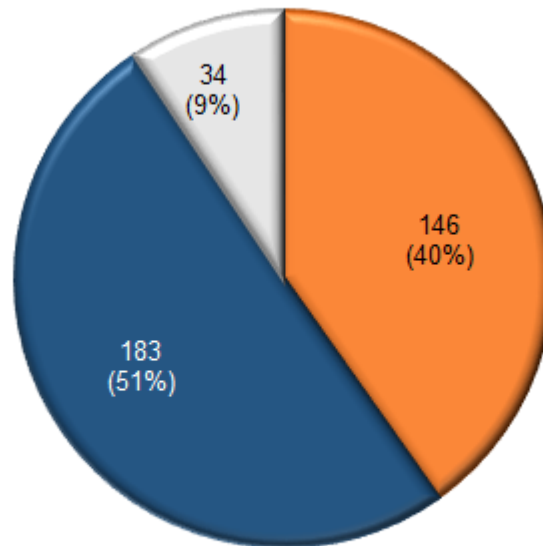
■ The system can accommodate changes or enhancements with minor technical and cost adjustments.

■ The system can accommodate changes or enhancements with significant technical and cost adjustments.

▨ The system cannot accommodate new changes or enhancements.

b. DTMB, the Department of Licensing and Regulatory Affairs (LARA), the Department of Treasury (Treasury), and the Department of State (DOS) are in the process of migrating the State's remaining applications from the Unisys mainframe to client/server and cloud computing environments. However, DTMB and the agencies have not finalized a firm date for decommissioning the mainframe. As agencies migrate their applications off the mainframe, the operations and maintenance cost for the remaining agencies will increase.

Applications residing on the Unisys mainframe are considered legacy because of the application programming languages used. For example, COBOL is a common programming language used. DTMB and State agencies informed us that, because most colleges and universities no longer include COBOL in their curriculums and because of a shortage of COBOL programmers in the market place, it is difficult and more expensive to maintain mainframe applications.

The following time line depicts DTMB's target dates for migrating department systems off the Unisys mainframe:

| September 30, 2014: DOC		August 30, 2019: LARA		Undetermined: Treasury
	June 9, 2016: DCH		April 30, 2021: DOS	

There are 27 major applications residing on the Unisys mainframe:

- The Department of Corrections (DOC) and the Michigan Department of Health and Human Services (MDHHS) migrated their applications off the Unisys mainframe in fiscal years 2014 and 2016, respectively. However, both agencies continue to incur minimal charges for storage of historical information.

- LARA has active projects to migrate its mainframe applications. The applications facilitate various business and operational areas, such as liquor control and workers' compensation.

- DOS mainframe applications facilitate all vehicle and driver-related services provided to the citizens of Michigan at local Secretary of State branch offices. In March 2017, DTMB entered into a $66.6 million contract with FAST Enterprises, LLC, to deliver an integrated driver license and motor vehicle system.

- In fiscal year 2015, Treasury completed its migration of the Sales, Use and Withholding Tax System from the Unisys mainframe to a client server platform. At the time of our review, Treasury was developing a legacy system modernization plan for the remainder of its mainframe applications but informed us that it had not yet identified funding sources and time lines.

Effective June 13, 2017, DTMB extended its contract with Unisys through July 31, 2022 for an additional $13 million, increasing the value of the contract to $36 million. The change notice includes the option to extend for an additional five years beyond 2022, if DTMB exercises all of the options. The contract is for the upgrade of the mainframe hardware and operating system software, maintenance, and support.

For fiscal years 2013 through 2017, mainframe processing costs averaged approximately $8 million per year. The following chart shows the distribution of mainframe costs among the remaining three departments for fiscal year 2017:

Distribution of Unisys Mainframe Costs
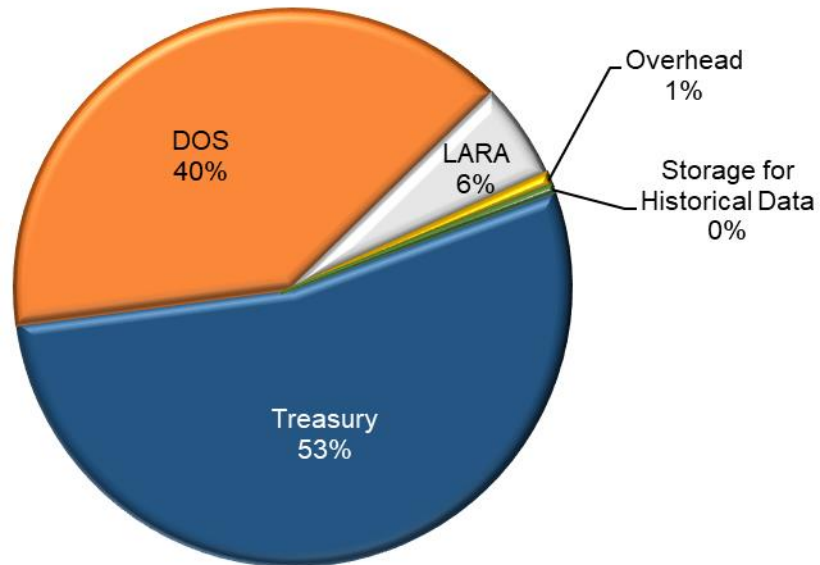
c. DTMB and State agencies utilized ITIF to replace some legacy systems. However, a significant backlog of legacy systems had not been planned and budgeted for replacement. For more information about selected legacy systems, see Exhibit #1 and Exhibit #2.

In 2012, DTMB contracted with Gartner, Inc., to identify opportunities to improve the effectiveness and efficiency* of DTMB's IT services and to help transform the State of Michigan to align with the Governor's vision. Gartner reported that the State's total IT spending was less than its peer group. However, the State expended a higher percentage on operations and a lower percentage on development and capital improvements than the peer group. As a result, the State had fewer opportunities to invest in strategic IT projects that are needed to transform the State's IT and business operations. Gartner identified legacy system replacement as an area in which the State could realize significant cost savings and benefits. Gartner estimated the cost to replace 45 legacy applications at $572 million over 10 years.

Significant cost savings and benefits could be realized through legacy system replacement.

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

In response to Gartner's findings, the Governor and the Legislature approved a special annual appropriation to address legacy technology and automation opportunities. The appropriation created the ITIF, which is restricted to funding:

- Enterprise IT investment* projects.

- Modernization of the State's IT systems.

- Improvement to the State's cybersecurity framework.

- Achievement of overall efficiencies.

Since its inception in fiscal year 2013 through fiscal year 2018, the Legislature appropriated $349.5 million in ITIF funds and DTMB expended $249.7 million on ITIF projects through fiscal year 2017, as follows:

Fiscal Year	Appropriated	Expended
2013	$ 47,000,000	$ 21,060,427
2014	47,000,000	34,363,292
2015	60,500,000	72,240,023
2016	65,000,000	75,798,355
2017	65,000,000	46,202,901
2018	65,000,000	*
Total	$349,500,000	$249,664,998

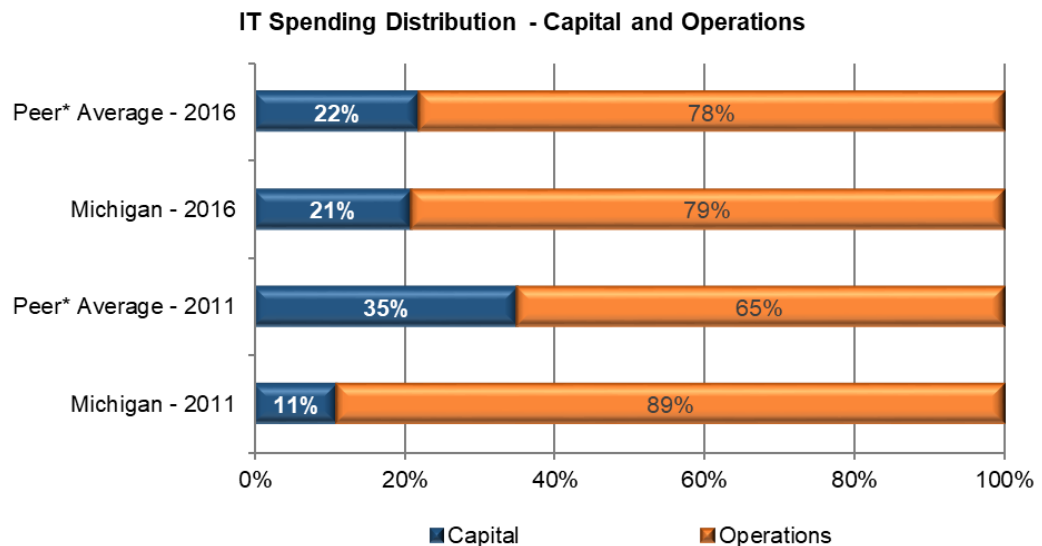***** Expenditure data is not yet available for fiscal year 2018.

In its fiscal year 2017 fourth quarter report to the Legislature, DTMB reported that the ITIF portfolio included 66 projects consisting of:

Legacy Projects Completed With ITIF
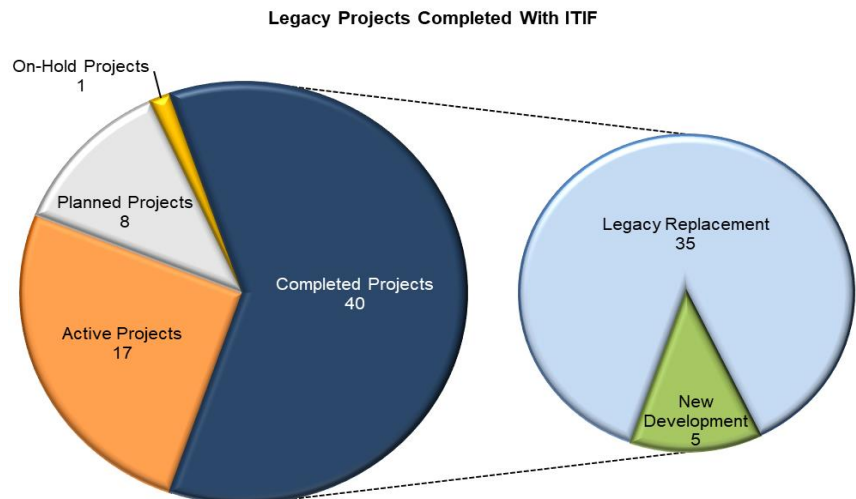
* See glossary at end of report for definition.

The largest project in the ITIF portfolio was for the development and implementation of the Statewide Integrated Governmental Management Applications* (SIGMA), the State's new enterprisewide financial management system, which went live in October 2017. SIGMA's $175.3 million budget accounts for 62% of the ITIF budget through fiscal year 2017.

In 2016, Gartner reviewed DTMB's progress toward implementing selected elements of the 2012 assessment, including IT spending and legacy modernization efforts. Gartner reported that the State's total IT spending continued to be less than its peers; however, the amount of IT expenses allocated to new development had increased. Therefore, DTMB's ratio of expenses allocated to operations and development aligned with its peers, as noted in the following table:

IT Spending Distribution - Capital and Operations

	Capital	Operations
Peer* Average - 2016	22%	78%
Michigan - 2016	21%	79%
Peer* Average - 2011	35%	65%
Michigan - 2011	11%	89%

*The peer groups in fiscal years 2011 and 2016 did not have the same membership.

Continued analysis of existing information systems will help direct DTMB's future legacy modernization efforts and IT investment decisions. Therefore, DTMB and State agencies should continue to regularly update, validate, and analyze system data contained in Changepoint.

We requested that State agencies identify their three oldest information systems and the three legacy systems that, if replaced, would provide the greatest benefit or ROI for agency operations. Exhibit #1 summarizes the agencies' responses to our survey dated July 26, 2017.

See glossary at end of report for definition.

MODERNIZATION OF LEGACY IT SYSTEMS
Department of Technology, Management, and Budget

Comparison of Oldest Systems and Systems With Greatest Return on Investment if Replaced, as Reported by Agencies
In Response to Our Survey Dated July 26, 2017

Department	System Name	Description	Date Implemented*	Reported by Agency	
				Oldest Systems	Systems With Greatest Return on Investment If Replaced
Agriculture and Rural Development (MDARD)	Pasutti Suite	Tracks nursery and agriculture products as well as fruit and vegetable inspection activities.	1999	X	X
	Dairy Milk Quality (DMQ)/ Dairy Farm Inspection System (DFIS)	Contains dairy milk quality and dairy farm inspection data.	~2000	X	X
	IMPACT	A pesticide applicator certification and registration system. System components include pesticide applicator registration, restricted use pesticide seller registration, pesticide applicator business license registration, and pesticide applicator certification scanning.	2004	X	X
Attorney General (AG)	Filemaker Pro	Supports the evidence tracking, imprest cash, inventory, library books, and training components of the AG's operations.	Late 1990s	X	X
Civil Rights (DCR)	Contact Management System (CMS)	Supports DCR's business function by providing a central repository for all contacts to DCR as well as providing process workflow for DCR service offerings and reporting functions.	1999	X	X
Civil Service Commission (CSC)	DSTARS/Tracker	Contains formal decisions rendered by the CSC, the Employment Relations Board, and adjudicating administrative officers. The system is used to track grievances and assignments.	1993	X	X
	Performance Management in HRMN Self-Service	A customized application operating in the State of Michigan's HRMN Self-Service system. Self-Service is an automated system used by State employees and human resource managers to view and maintain personnel information related to employee benefits, leave balances, pay warrant information and withholdings, and life events.	2003	X	X
	Document Tracking System	Manages required documents in the Michigan HR call center.	2006	X	X
Corrections (DOC)	Crime Victims Letter Notification (VRLN)	Notifies crime victims of an inmate's transfer or release.	Mid 1990s	X	X
	Visitor Tracking System (VTS)	A system to track and control the prisoner visiting process.	Mid 1990s	X	
	Trust Accounting and Payroll System (TAPS or TRUST)	Records and processes prisoner funds held in trust by DOC.	Late 1990s	X	X
	Offender Management Network Information System (OMNI)	Tracks and monitors prisoner, parolee, and probationer information.	2002		X

This exhibit continued on next page.

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				Oldest Systems	**Systems With Greatest Return on Investment If Replaced**
Education (MDE)	Cash Management System (CMS)	Used by local school districts to request funds for federal grant money. CMS also provides reporting data for financial transactions.	2006	X	X
	Migrant System (MEDS)	Determines eligibility for the Migrant Education Program and collects Migrant Student Information eXchange data.	2006	X	
	State Aid Management System (SAMS)	Distributes School Aid Act funds to public school districts across the State.	2010		X
	Michigan Electronic Grants System + (MEGS+)	Used by school districts, local educational agencies, public school academies, and other education-related agencies to apply for federal formula grants and the majority of MDE-sponsored competitive grants. Used to create, submit, approve, track, and amend grant applications.	2011	X	X
Environmental Quality (DEQ)	LabWorks Laboratory Information Management System (LIMS) and Laboratory Information Management System Accounts Receivable (LIMS/AR)	Tracks water samples from their receipt through the testing process and generates testing result reports for customers. LIMS/AR is an interface that provides billing and accounts receivable information from LIMS to the State's accounting system.	Late 1990s		X
	WaterChem	Maintains water sample data for all DEQ programs and interfaces with the Drinking Water Laboratory database.	Late 1990s	X	
	Michigan Air Compliance & Enforcement System (MACES) and Michigan Air Emissions and Reporting System (MAERS)	Maintains information regarding compliance and enforcement activities related to facilities that have the potential to impact air quality. MAERS collects emissions data from permitted sources and facilities.	2000		X
	Drinking Water Permit (DWPermit)	Tracks drinking water permits and associated facility and tank information.	2000	X	
	Wellogic	Maintains drinking water well construction reports and tracks compliance for well drilling contractors.	2000	X	
	Safe Drinking Water Information System	A database designed by the U.S. Environmental Protection Agency (EPA) to help states run their drinking water programs.	2001		X
Michigan Department of Health and Human Services (MDHHS)	Adult Services Comprehensive Assessment Program (ASCAP)	Used for intake, maintenance, comprehensive assessment, task assignment, and payment authorization of adult services including independent living services, adult community placement, and adult protective services.	1990s	X	
	Family Subsidy Support (FSS) Payments	Maintains data and generates assistance checks for clients that meet program requirements.	1990s	X	

This exhibit continued on next page.

MODERNIZATION OF LEGACY IT SYSTEMS
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				Oldest Systems	Systems With Greatest Return on Investment If Replaced
MDHHS, continued	MSA Manual Payment System	Collects and maintains payment data for transportation, field clinic, maternity outpatient medical services, otology, and traumatic brain injury.	1990s	X	
	Michigan Child Support Enforcement System (MiCSES)	Performs critical child support functions including case initiation, parent locate, paternity and court order establishment, and child support collection and distribution.	2000		X
	Bridges Integrated Automated Eligibility Determination System (Bridges)	A social services computer system that processes client intake applications; registration; eligibility determination; and the issuance of cash assistance, medical assistance, food assistance, and child care assistance.	2008		X
	Michigan Statewide Automated Child Welfare Information System (MiSACWIS)	Supports case management for child protective services, adoption, foster care, juvenile justice, and child abuse prevention services provided to children and families. The system generates weekly payroll files for processing payments to private foster care providers, service providers, and foster homes.	2014		X
Insurance and Financial Services (DIFS)	OBase	Contains data used to regulate insurance companies, agents, and agencies; consumer finance entities; and insurance education providers.	Mid 1990s	X	X
	DIFS Search Pages	Provides online information about licensees as a public service, allowing the public to view demographic and license information.	Early 2000s	X	
	Credit Union Management Information System	Manages and tracks day-to-day operations involving credit unions.	Unknown	X	X
Licensing and Regulatory Affairs (LARA)	Liquor Financial System	Tracks the purchase, sale, and inventory of distilled spirits.	1980s	X	
	Liquor Licensing System	Provides the Licensing Division with the ability to process and oversee the application and renewal of retail, wholesale, and manufacturer liquor licenses. The system also manages enforcement, executive services, and certain financial aspects of the liquor licensing process.	1990s	X	X
	Workers' Compensation System (WORCS)	Tracks workers' compensation claims of injured workers and proof of coverage for employers that need workers' compensation coverage in the State.	1990	X	
	CORPS	Tracks corporate entity information and images for annual reports.	2001		X
	License 2000/MyLicense	Manages over 200 health, occupation, and facility licenses.	2001		X

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				Oldest Systems	**Systems With Greatest Return on Investment If Replaced**
Natural Resources (DNR)	Timber Sales	Processes timber sale documents and transactions when timber is sold by the State to the public.	1993	X	
	Retail Sales System (RSS)	Processes the sale of hunting and fishing licenses, off-road vehicle and snowmobile permits, sport cards, gift cards, and donations through point-of-sale terminals throughout Michigan.	2012		X
	Fish Stocking Information System (FSIS)	Maintains fish stocking levels for all Michigan water bodies and stores stocking plans and allocations, survey information, and report information.	2002	X	
	Fish Collection System (FCS)	Collects, manages, and reports water body survey data including fish species, size, age, temperature, and limnology.	2003	X	
	Asset Management System	Tracks DNR buildings, equipment, and other assets.	Unknown		X
	Central Reservation System (CRS)	Allows individuals to reserve State campground and harbor sites for lodging or other recreational activities.	2012		X
State (DOS)	Driver & Vehicle Records System (Mainframe)/ Branch Office System (BOS)	Processes driver- and vehicle-related transactions at local Secretary of State branch offices.	Mainframe system in mid-1960 and BOS in 2001 2001 (BOS)	X	X
	Driver Assessment Information System	Processes the results of administrative hearings for drivers with suspensions, denials, and/or revocations of their license.	1985	X	X
	Qualified Voter File (QVF)	Maintains voter registration records for nearly 8 million Michigan registered voters. In addition, QVF assists local jurisdictions with various election management functions, including absentee voter ballot processing, petition and candidate tracking, election planning, and election inspector tracking.	1998	X	X
Michigan State Police (MSP)	Law Enforcement Information Network (LEIN)	Used by local law enforcement and criminal justice agencies to access criminal justice information, including missing persons, arrest warrants, unidentified persons, and stolen vehicles.	1967	X	
	Automated Fingerprint Identification System (AFIS)	Nationwide system for encoding, searching, and matching fingerprints.	1998	X	X
	Automated Incident Capture System (AICS)	Maintains incident reports prepared and submitted by law enforcement.	1998	X	

This exhibit continued on next page.

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				Oldest Systems	**Systems with Greatest Return on Investment If Replaced**
MSP, continued	Michigan Incident Crime Reporting (MICR)	An input tool used by law enforcement to maintain crime activity used for statistical reporting.	1999		X
	Criminal History Record Database (CHRD)/ Automated Law Enforcement Information Access System (ALIAS)	Maintains Statewide arrest, prosecution, and judicial information for law enforcement agencies, courts, and other users. MSP uses the system to process applicant and criminal fingerprint matches.	2005		X
Talent and Economic Development (TED)	MSHDA Activity Tracking Tool (MATT)	Grant management system used to manage housing grants and provide workflow for tracking other nongrant programs.	2003	X	X
	FileNet Imaging Services	An electronic repository of documents related to unemployment claimants and employers. The stored documents are subsequently retrieved for claims review, adjudication, and verification.	2005		X
	Housing Development Software (HDS)	Collects, manages, and tracks tenant data for all federally regulated assisted units. The system assists in quality control reviews of monthly housing assistance payment vouchers.	2006	X	
	Managing of Awards to Recipients System (MARS)	Creates award notifications to recipients (Grant Action Notices), tracks grant awards, and records grant expenditures by recipient.	2008	X	
	King Chavez Parks	Collects data, monitors expenditures, allocates funding, and tracks payment history for student loans.	Prior to 2010		X
Technology, Management, and Budget (DTMB)	MAIN - Advanced Purchasing and Inventory Control System (ADPICS)	Statewide purchasing system. This system was replaced by SIGMA.	1990s	X	X
	MAIN - Relational Standard Accounting and Reporting System (R*STARS)	Statewide accounting system. This system was replaced by SIGMA.	1990s	X	X
	Data Collection and Distribution System (DCDS)	Statewide time entry system. This system was replaced by SIGMA.	1990s	X	X
Transportation (MDOT)	Grade Crossing Management System (GCMS)	Collects inventory and conditions of more than 5,000 railroad crossings within Michigan.	Early 1990s	X	X
	MAP Financial Obligation System (MFOS)	Obtains Federal Highway Administration authorization and funding on highway projects, including federal, State, and local funding on all highway and aeronautics projects. In addition, MFOS provides information utilized in monitoring all highway funding sources. This system was replaced by SIGMA at the beginning of fiscal year 2018.	Early 1990s	X	X

This exhibit continued on next page.

MODERNIZATION OF LEGACY IT SYSTEMS
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| | | | | Reported by Agency | |
| | | | | **Oldest Systems** | **Systems with Greatest Return on Investment If Replaced** |
Department	System Name	Description	Date Implemented*		
MDOT, continued	Real Estate Management Information System (REMIS)	Stores information related to real estate procurement at a job and parcel level.	~1997	**X**	**X**
	Real Estate Sale & Leasing System (RESALE)	Tracks the engineering review process, sales process, auction set-up process, and the status of real estate inventory.	~1997	**X**	**X**
	Project Accounting and Billing (PAB)	Processes and maintains accounting and billing records for highway and aeronautics funded projects. The system was replaced by SIGMA at the beginning of fiscal year 2018.	2005	**X**	**X**
Treasury	Warrant Writing	Provides quality control and reporting on warrant transactions from MAIN and the Consolidated Print Center. The system is expected to be decommissioned in May 2018.	1974	**X**	
	Business Tax Registration	Processes and manages Michigan business tax returns.	1979	**X**	
	Sales, Use, and Withholding Taxes (SUW)	Processes and manages sales, use, and withholding payments and tax returns.	1982	**X**	
	State Treasury Accounts Receivable System	Manages and processes all delinquent individual and business taxes and other debts owed to the State of Michigan.	1988		**X**
	Motor Fuel Tax Processing and Cigarette Tax Processing	Processes and manages tobacco products tax returns as well as motor fuel tax returns.	1994		**X**
	Garnishment and Levies	Enforces court-ordered garnishments by intercepting or garnishing outgoing payments to a payee.	1995		**X**

* Systems may have components newer than the reported implementation date.

Source: The OAG prepared this exhibit from survey responses provided by 17 State agencies to our survey dated July 26, 2017. Agencies generally identified their three oldest legacy systems and their three legacy systems that if replaced, would provide the greatest return on investment.

MODERNIZATION OF LEGACY IT SYSTEMS
Department of Technology, Management, and Budget

Legacy System Profiles

This exhibit contains profiles of 12 information systems that we judgmentally selected from the systems that the State agencies identified as providing the greatest ROI if replaced. We selected systems that represent a range of ages and investment values.

Criminal History Record Database (CHRD)/Automated Law Enforcement Information Access System (ALIAS)

Michigan Department of State Police (MSP)

Number of users: ~ 100 internal and thousands of external users

System implementation date: 2005

Age: ~ 12 years

Anticipated system retirement date: None

Fiscal year 2016 costs: $814,000

TCO: $9,500,000 (excludes payroll and overhead)

Development costs: Unknown

Operations and maintenance costs: Unknown

Plans for retirement or modernization: Yes, beginning in 2018

TCO:

100%
$9,500,000
Development, operations, and maintenance costs

CHRD/ALIAS provides Statewide arrest, prosecution, and judicial information to law enforcement agencies, courts, and other users. MSP uses CHRD/ALIAS to process applicant and criminal fingerprint matches.

CHRD/ALIAS is a critical component of Michigan's law enforcement backbone with approximately 100 internal MSP users and thousands of external users, including over 600 law enforcement agencies, 300 courts, and 83 county prosecuting attorney offices.

Components of CHRD/ALIAS's architecture are obsolete and will become unsupported. Updates are needed to comply with legislative mandates, improve system security, and address performance issues.

The system has been continuously modernized since its inception in 2005. In total, 113 production releases have occurred between November 2005 and October 2017 to update, fix, enhance, and modernize the system.

Beginning in fiscal year 2018, MSP anticipates initiating multiple projects to modernize CHRD/ALIAS, including database, interface, and program code updates.

Source: The OAG prepared this system profile using information provided by MSP and DTMB.

This exhibit continued on next page.

FileNet Imaging Services (FileNet)

Department of Talent and Economic Development (TED) - Unemployment Insurance (UI)

Number of users: 600

System implementation date: 2005

Age: ~ 12 years

Anticipated system retirement date: Unknown, pending approval of funding
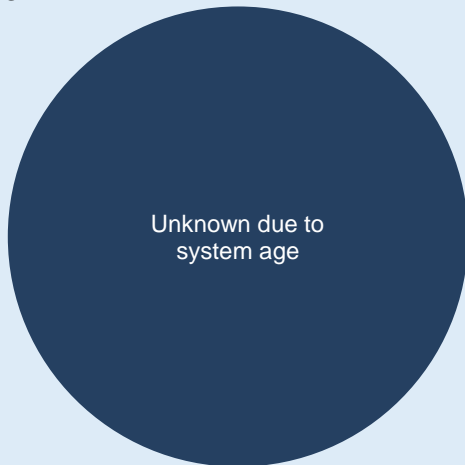
Fiscal year 2016 costs: ~ $1 million

TCO: Unknown due to system age

Development costs: Unknown

Operations and maintenance costs: Unknown

Plans for retirement or modernization: None
TCO:

Unknown due to system age

FileNet is UI's electronic document repository related to unemployment insurance claimants and employers. The stored documents are retrieved for claims review, adjudication, and verification.

FileNet is a customized commercial off-the-shelf (COTS) application supported by DTMB Agency Services. In addition to meeting the State's definition of a legacy system, there have been significant issues integrating FileNet with the Michigan Integrated Data Automated System (MiDAS), UI's system for collecting unemployment taxes and dispersing unemployment insurance benefits.

UI and DTMB indicated that challenges to modernizing FileNet include interdependencies with other UI systems and the need for vendor specific support to perform a major upgrade.

UI has no formal plans to modernize FileNet. However, UI and DTMB have completed a preliminary analysis to transition the system into DTMB's Next Generation Digital Infrastructure (NGDI) environment.

Source: The OAG prepared this system profile using information provided by UI and DTMB.

This exhibit continued on next page.

LabWorks Laboratory Information Management System (LIMS) and LIMS/AR

Department of Environmental Quality (DEQ)

Number of users: 30

System implementation date: Late 1990s

Age: ~ 20 years

Anticipated system retirement date: 2019
 (The LIMS/AR interface was replaced in 2016.)

Fiscal year 2016 costs: Unknown

TCO: Unknown

Development costs: Unknown

Operations and maintenance costs: Unknown

Plans for retirement or modernization:
 Anticipated retirement of the system in 2019

TCO:

Unknown due to system age

DEQ's Drinking Water Laboratory uses LIMS to manage its analysis of drinking water samples. LIMS tracks water samples from their receipt through the testing process and generates testing result reports for customers. LIMS/AR is an interface that provides billing and accounts receivable information from LIMS to the State's accounting system.

LIMS is an unsupported version of a LabWorks COTS application. As such, State employees provide maintenance and support for the application. LIMS interfaces with a suite of applications that are also running on outdated technologies.

Replacing LIMS and the related suite of applications will allow DEQ's Drinking Water Laboratory to modernize its ability to test and track drinking water samples.

With the implementation of the State's new accounting system, SIGMA, DEQ was able to replace LIMS/AR. DEQ's Environmental Laboratory replaced its implementation of LabWorks LIMS with Promium Element software. DEQ is evaluating whether this software will work for its Drinking Water Laboratory. DEQ anticipates that LIMS can be retired prior to 2019.

Source: The OAG prepared this system profile using information provided by DEQ and DTMB.

This exhibit continued on next page.

License 2000/MyLicense (L2K)

Department of Licensing and Regulatory Affairs (LARA)
Number of users: More than 250 internal users and the general public

System implementation date: 2001

Age: 16 years

Anticipated system retirement date: December 31, 2020

Fiscal year 2016 costs: $670,000

TCO: Unknown due to system age

Development costs: Unknown

Operations and maintenance costs: $12,110,420

Plans for retirement or modernization: Yes, all phases for retirement are to be complete as of December 31, 2020.

TCO:

Unknown due to system age

L2K is a COTS application used to manage over 200 health, occupation, and facility licenses. L2K is used by more than 250 internal State users and the general public to apply for or renew various State of Michigan licenses.

L2K is no longer supported by the vendor and the software is difficult to configure to support current LARA operations. To overcome these limitations, DTMB has modified L2K to include various unconventional software customizations, resulting in high maintenance costs and the need for a specialized skill-set to support the system. In addition, DTMB informed us that it is difficult to adhere to the State's security requirements because of L2K's legacy code and system architecture.

In 2011, LARA and DTMB attempted to upgrade L2K to the vendor's new product offering; however, the upgrade was unsuccessful because the vendor could not meet LARA's business requirements.

LARA and DTMB are in the process of replacing L2K with Accela's cloud-based software as a service platform. Phase 1 of the replacement has been completed, and the remaining phases are expected to be completed by December 31, 2020.

Source: The OAG prepared this system profile using information provided by LARA and DTMB.

This exhibit continued on next page.

Michigan Child Support Enforcement System (MiCSES)

Michigan Department of Health and Human Services (MDHHS)

Number of users: Over 2,000 State and county employees

System implementation date: 2003

Age: ~ 14 years

Anticipated system retirement date: 2025

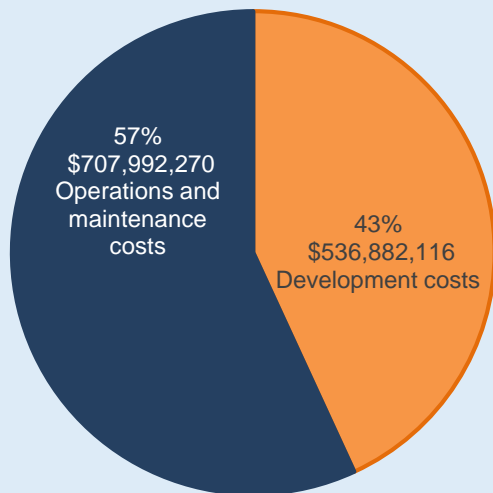**Fiscal year 2016 costs:** $41,876,600

TCO: $1,244,874,386

Development costs: $536,882,116

Operations and maintenance costs: $707,992,270

Plans for retirement or modernization: A feasibility study will be conducted in the upcoming 3 years.

TCO:

57%
$707,992,270
Operations and maintenance costs

43%
$536,882,116
Development costs

MiCSES performs critical child support functions, including case initiation, parent location, paternity and court order establishment, and child support collection and distribution. MiCSES contains case records and account information for more than 850,000 active child support cases. In addition, MiCSES collects and disburses more than $1.3 billion in child support payments annually.

MiCSES is a complex Oracle Forms client/server application that includes various Web components. The application is supported by DTMB and a third-party vendor.

MiCSES has been identified as a candidate for replacement on MDHHS's TIME model (see Exhibit #4). MDHHS plans to perform a business process analysis and feasibility study over the next three years. After analyses are completed, MDHHS will determine its next steps and overall time line to implement a modernized system.

Source: The OAG prepared this system profile using information provided by MDHHS and DTMB.

This exhibit continued on next page.

Michigan Electronic Grants System Plus (MEGS+)

Michigan Department of Education (MDE)

Number of users: 6,239

System implementation date: 2011

Age: 7 years

Anticipated system retirement date: 2020
 (Vendor contract end date)

Fiscal year 2016 costs: $769,875

TCO: Unknown

Development costs: Unknown

Operations and maintenance costs: Unknown

Plans for retirement or modernization:
 MDE has submitted request for funding to replace
 MEGS+.

TCO:

Unknown

MEGS+ is an automated Web-based information system used to create, submit, approve, track, and amend grant applications. All public school districts, local educational agencies, public school academies, and other education-related agencies use MEGS+ to apply for federal formula grants and the majority of MDE-sponsored competitive grants. MEGS+ manages the allocation of over 50 federally funded and State-funded grants. MEGS+ shares data with MDE's Cash Management System (CMS), which calculates and processes grant payments. MEGS+ is also used to collect data and report on participation in various child nutrition programs.

MDE and DTMB informed us that support for the MEGS+ application code (ASP.Net 4.0 framework) ended on January 1, 2016. As a result, the system's online application forms have become outdated and additional enhancements are not recommended using the current technology. MDE and DTMB indicated that the framework could be upgraded; however, it is dependent upon upgrading the underlying operating system.

MEGS+ is highly integrated with CMS; however, the systems exchange data in a manner that does not follow best practices. As a result, modifications and upgrades to one system may negatively impact the other system.

The current MEGS+ contract expires in 2020 and does not include an option to extend the contract. According to the contract, the vendor owns the MEGS+ source code. After the contract expires, MDE and DTMB will have access to MEGS+ data but will not have access to the MEGS+ system.

MDE and DTMB plan to upgrade the MEGS+ Web servers in fiscal year 2018. MDE and DTMB are in the process of hiring a business analyst to assist in identifying available replacement solutions. In its fiscal year 2019 funding request, MDE submitted a proposal to replace MEGS+.

Source: The OAG prepared this system profile using information provided by MDE and DTMB.

This exhibit continued on next page.

OBase

Department of Insurance and Financial Services (DIFS)

Number of users: 260

System implementation date: Mid 1990s

Age: ~ 22 years

Anticipated system retirement date: Unknown due to system age

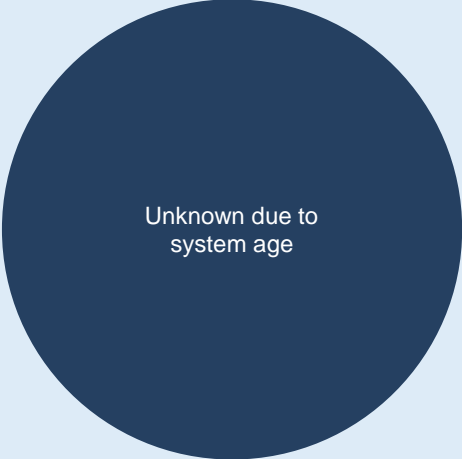**Fiscal year 2016 costs:** ~ $360,000

TCO: Unknown due to system age

Development costs: Unknown due to system age

Operations and maintenance costs: Unknown due to system age

Plans for retirement or modernization: The agency is beginning to plan for the system's retirement.

TCO:

Unknown due to system age

OBase is DIFS's primary business application to assist in the regulation of insurance companies, insurance agents, consumer finance entities, and insurance education providers. OBase supports various business functions including licensing, billing, complaint processing, investigations, enforcement, and examinations.

OBase was written in PowerBuilder, which is no longer supported by the vendor. OBase has been extensively modified since it was implemented in the 1990s and has become difficult and expensive to maintain because there are few skilled PowerBuilder developers.

DIFS and DTMB have made several attempts to replace OBase with a COTS application. In 2014, the most recent attempt ended with the cancellation of the vendor's contract and a subsequent legal settlement in 2015. According to DIFS and DTMB, replacing OBase has been challenging because existing market place solutions do not address DIFS's business needs.

Source: The OAG prepared this system profile using information provided by DIFS and DTMB.

This exhibit continued on next page.

Offender Management Network Information System (OMNI)

Department of Corrections (DOC)

Number of users: ~ 9,500

System implementation date: 2002

Age: ~ 16 years

Anticipated system retirement date: December 30, 2022

Fiscal year 2016 costs: ~ $2 million

TCO: $53.5 million

Development costs: $22 million

Operations and maintenance costs: $31.5 million

Plans for retirement or modernization: Yes, estimated completion in the next 3 to 5 years

TCO:

59%
$31,500,000
Operations and maintenance costs

41%
$22,000,000
Development costs

OMNI is an information system used by DOC to track and monitor prisoner, parolee, and probationer information. DOC enters data into OMNI at the time of an offender's pre-sentence investigation and continues capturing data until the offender is discharged. OMNI interfaces with multiple corrections and law enforcement systems including the Law Enforcement Information Network, which allows law enforcement to make inquiries into the OMNI database.

OMNI was written using PowerBuilder, an unsupported programming language, and Sybase, an end-of-life database management system. DOC and DTMB informed us that it is difficult to find skilled developers to support the system and that OMNI's technology platform makes it increasingly difficult to modify the system to meet DOC's business needs, resulting in fragmented data and inefficient business processes.

In June 2016, DOC initiated the Offender Management System (OMS) project. The project is currently in Phase 2. DOC and DTMB are planning to procure a configurable COTS or software as a service (SaaS) solution to replace OMNI and other legacy technologies. The primary goal of the project is to provide one integrated system that can automate all functions related to the offender.

DOC and DTMB estimated that OMS will be completed in the next 3 to 5 years.

Source: The OAG prepared this system profile using information provided by DOC and DTMB.

This exhibit continued on next page.

Pasutti Suite

Michigan Department of Agriculture and Rural Development (MDARD)

Number of users: 65

System implementation date: 1999

Age: 18 years

Anticipated system retirement date: Unknown

Fiscal year 2016 costs: ~ $7,200

TCO: Unknown due to system age

Development costs: Unknown

Operations and maintenance costs: Unknown

Plans for retirement or modernization: The agency is in the initial planning stages for replacement. A replacement is anticipated for mid fiscal year 2019.

TCO:

Unknown due to system age

The Pasutti Suite is MDARD's tracking system for nursery and agriculture products and fruit and vegetable inspections. The system is used to collect field inspection data and to produce inspection reports, sample collection reports, and various certificates. MDARD inspectors use a field inspection version on their notebook computers to input the data that produces the reports; the data is then transferred via file transfer protocol server to the Lansing MDARD office where it is imported into the master Statewide database. The Statewide data is then packaged for the inspectors, supervisors, and program staff to download into either the field databases or the management databases.

The Pasutti Suite, a collection of Microsoft Access Databases, was developed internally by an MDARD inspector and is maintained by MDARD. MDARD and DTMB indicated that the Pasutti Suite, although highly functional, requires a manual syncing process that is inefficient and labor intensive. In addition, MDARD's licensing system is being rebuilt and will require a new interface for the system so that inspectors can access nursery information.

MDARD and DTMB are in the initiation and planning stages for replacing the Pasutti Suite software, and they anticipate a mid-fiscal year 2019 implementation date for the new system.

Source: The OAG prepared this system profile using information provided by MDARD and DTMB.

This exhibit continued on next page.

Qualified Voter File (QVF)

Department of State (DOS)

Number of users: ~ 3,000 DOS and local municipality employees as well as approximately 8 million voters (via the Internet)

System implementation date: 1998

Age: 19 years

Anticipated system retirement date: 2019

Fiscal year 2016 costs: $810,000

TCO: Unknown due to system age

Development costs: Unknown due to system age

Operations and maintenance costs: Unknown due to system age

Plans for retirement or modernization: Yes, plans are currently in progress. Estimated completion is May 2018 for Phase 1 and April 2019 for Phase 2.

TCO:

Unknown due to system age

The Qualified Voter File (QVF) system is a client-based application that maintains voter registration records for nearly 8 million Michigan registered voters. In addition, QVF assists local jurisdictions with various election management functions including absentee voter ballot processing, petition and candidate tracking, election planning, and election inspector tracking.

Approximately 3,000 DOS Bureau of Elections and local municipality employees use QVF. In addition, registered voters interact with QVF via the Internet.

QVF is a client-based application that is installed on individual computers in each county and local election jurisdiction. DOS and DTMB informed us that, because QVF's system architecture is distributed, QVF is time-consuming and cumbersome to maintain. In addition, QVF's batch processing cycle causes delays in data sharing between the approximately 470 sites utilizing QVF. Also, QVF's application software no longer complies with SOM standards.

DOS and DTMB are in the process of updating QVF to new application and database platforms with estimated completion dates of May 2018 and April 2019 for Phase 1 and Phase 2, respectively. DOS and DTMB anticipate that the upgrade will provide increased functionality such as ballot administration, petition functions, and reduced reliance on the current replication strategy.

Source: The OAG prepared this system profile using information provided by DOS and DTMB.

This exhibit continued on next page.

Real Estate Management Information System (REMIS)

Michigan Department of Transportation (MDOT)

Number of users: ~ 70

System implementation date: 1997

Age: ~ 20 years

Anticipated system retirement date: Unknown
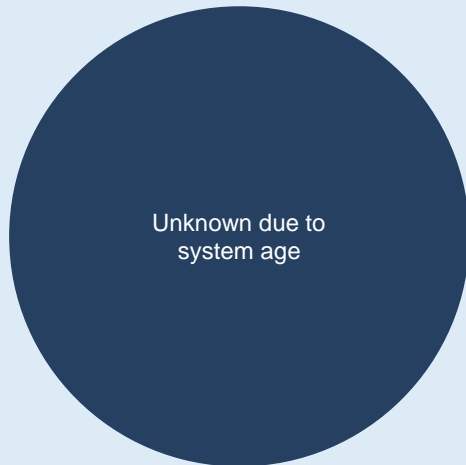
Fiscal year 2016 costs: ~ $70,000

TCO: Unknown due to system age

Development costs: Unknown due to system age

Operations and maintenance costs: Unknown due to system age

Plans for retirement or modernization: MDOT has submitted a candidate for replacement.

TCO:

Unknown due to system age

MDOT uses REMIS to record all data regarding the acquisition of property. REMIS provides reminder data to the ReSaLe system, which tracks the engineering review process, sales process, auction process, and status of properties.

REMIS is a legacy PowerBuilder application. MDOT has initiated plans to replace the system and has completed a lean process improvement for the REMIS business process. MDOT completed a business case in the 2018 Call for Projects process and plans to begin replacing REMIS in the fourth quarter of fiscal year 2018.

Source: The OAG prepared this system profile using information provided by MDOT and DTMB.

This exhibit continued on next page.

State Treasury Accounts Receivable System (STAR)

Department of Treasury

Number of users: 1,000

System implementation date: October 1, 1987

Age: 30 years

Anticipated system retirement date: ~ 2023

Fiscal year 2016 costs: ~ $3,200,000 (estimated)
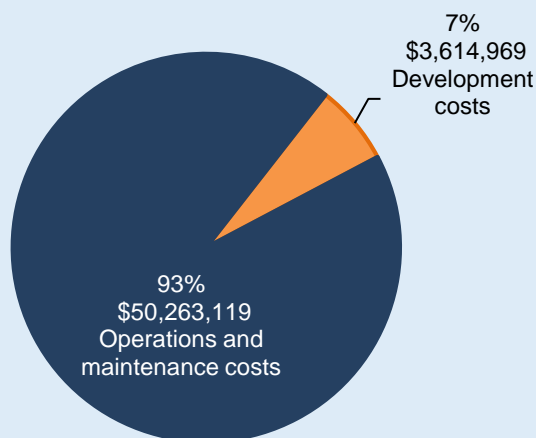
TCO: ~ $53,878,088 (estimated)

Development costs: ~ $3,614,969 (estimated)

Operations and maintenance costs:
~ $50,263,119 (estimated)

Plans for retirement or modernization: The agency plans to retire the system after identifying a feasible solution.

TCO:

7%
$3,614,969
Development costs

93%
$50,263,119
Operations and maintenance costs

STAR is a mainframe computer system used by the Office of Collections, Department of Treasury, to manage and process delinquent individual and business taxes and other debts owed to the State of Michigan. STAR annually processes 2.6 million financial transactions and 1.0 million assessments valued at $1.5 billion. In addition, DTMB and Treasury manage 57 interfaces between STAR and other applications.

Implemented over 30 years ago, STAR is one of the State's oldest applications running on the Unisys mainframe. Although the mainframe hardware and operating system software have been updated to the latest version and are included on the State's Enterprise Architecture Technology Roadmap, STAR is written in the COBOL 74 programming language.

Treasury and DTMB indicated that, because of changes in programming techniques and coding languages, modernizing STAR is a challenge and their research has not identified a readily available COTS solution. Although personnel are currently available to support the application, obtaining personnel with the appropriate programming skills will become more difficult in the future.

Since 2014, Treasury has been migrating compatible functions of STAR to its vendor-supported Michigan Accounts Receivable Collection System (MARCS). After migration is complete, only the ledger and interface functions will remain in STAR. Treasury contracted with Gartner, Inc. for a Tax Modernization Strategic Solution Assessment that includes identification of a solution to modernize STAR. Treasury estimates that it will replace STAR with an appropriate solution by 2023.

Source: The OAG prepared this system profile using information provided by Treasury and DTMB.

SUPPLEMENTAL INFORMATION

Exhibit #3

MODERNIZATION OF LEGACY IT SYSTEMS
Department of Technology, Management, and Budget

Comparison of ITIF and Non-ITIF Key Practices of the ITIM Maturity Model
As of September 30, 2017

Stage	Critical Process	Total Key Practices	ITIF Maturity Assessment Number of Key Practices			Non-ITIF Maturity Assessment Number of Key Practices		
			Executed	In Progress	Not Executed	Executed	In Progress	Not Executed
1	Creating investment awareness	1	1 (100%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)
2	Building the investment foundation							
2.1	Instituting the Investment Board - To define and establish an appropriate IT investment management structure and processes for selecting, controlling, and evaluating IT investments.	8	8 (100%)	0 (0%)	0 (0%)	2 (25%)	4 (50%)	2 (25%)
2.2	Meeting Business Needs - To ensure that IT projects and systems support the organization's business and user needs.	7	5 (71%)	2 (29%)	0 (0%)	4 (57%)	3 (43%)	0 (0%)
2.3	Selecting an Investment - To ensure that a well-defined and disciplined process is used to select new IT proposals and reselect ongoing investments.	10	5 (50%)	3 (30%)	2 (20%)	4 (40%)	4 (40%)	2 (20%)
2.4	Providing Investment Oversight - To review the progress of IT projects and systems, using predefined criteria and checkpoints, in meeting cost, schedule, risk, and benefit expectations and to take corrective action when these expectations are not being met.	7	3 (43%)	4 (57%)	0 (0%)	3 (43%)	4 (57%)	0 (0%)
2.5	Capturing Investment Information - To make available to decision-makers information to evaluate the impacts and opportunities created by proposed (or continuing) IT investments.	6	6 (100%)	0 (0%)	0 (0%)	6 (100%)	0 (0%)	0 (0%)
	Stage 2 Total Practices	38	27 (71%)	9 (24%)	2 (5%)	19 (50%)	15 (39%)	4 (11%)
3	Developing a complete investment portfolio							
3.1	Defining the Portfolio Criteria - To ensure that the organization develops and maintains IT portfolio selection criteria that supports its mission, organizational strategies, and business priorities.	7	7 (100%)	0 (0%)	0 (0%)	2 (29%)	4 (57%)	1 (14%)
3.2	Creating the Portfolio - To ensure that IT investments are analyzed according to the organization's portfolio selection criteria and to ensure that an optimal IT investment portfolio with manageable risks and returns is selected and funded.	7	6 (86%)	1 (14%)	0 (0%)	2 (29%)	5 (71%)	0 (0%)
3.3	Evaluating the Portfolio - To review the performance of the organization's investment portfolio(s) at agreed-upon intervals and to adjust the allocation of resources among investments as necessary.	7	4 (57%)	2 (29%)	1 (14%)	2 (29%)	3 (43%)	2 (29%)
3.4	Conducting Post-Implementation Reviews - To compare the results of recently implemented investments with the expectations that were set for them and to develop a set of lessons learned from these reviews.	6	4 (67%)	2 (33%)	0 (0%)	4 (67%)	2 (33%)	0 (0%)
	Stage 3 Total Practices	27	21 (78%)	5 (19%)	1 (4%)	10 (37%)	14 (52%)	3 (11%)
4	Improving the investment process							
4.1	Improving the Portfolio's Performance - To assess and improve the performance of the IT investment portfolio and the investment management process.	6	1 (17%)	4 (67%)	1 (17%)	1 (17%)	3 (50%)	2 (33%)
4.2	Managing the Succession of Information Systems - To ensure that IT investments in operation are periodically evaluated to determine whether they should be retained, modified, replaced, or otherwise disposed of.	9	2 (22%)	6 (67%)	1 (11%)	2 (22%)	6 (67%)	1 (11%)
	Stage 4 Total Practices	15	3 (20%)	10 (67%)	2 (13%)	3 (20%)	9 (60%)	3 (20%)
5	Leveraging IT for strategic outcomes							
5.1	Optimizing the Investment Process - To identify and implement measurable improvements in the organization's IT investment management processes so that the processes meet or exceed those used by best-in-class organizations.	7	0 (0%)	3 (43%)	4 (57%)	0 (0%)	3 (43%)	4 (57%)
5.2	Using IT to Drive Strategic Business Change - To dramatically improve business outcomes by employing IT investments strategically.	6	3 (50%)	2 (33%)	1 (17%)	3 (50%)	2 (33%)	1 (17%)
	Stage 5 Total Practices	13	3 (23%)	5 (38%)	5 (38%)	3 (23%)	5 (38%)	5 (38%)

Source: The OAG created this exhibit using the GAO's *Information Technology Investment Management: A Framework for Assessing and Improving Process Maturity* and data obtained from DTMB (EPMO and Agency Services) and State agencies.

MODERNIZATION OF LEGACY IT SYSTEMS
Department of Technology, Management, and Budget

TIME Map Process

On a yearly basis, State agencies, in conjunction with DTMB Agency Services, assess the status of their applications by answering business and technical questions in Changepoint including:

Business Related

1. How many users (both internal and external) are there?

2. Does the application serve the business function?

3. What is the ease of use of the application?

4. What is the strategic importance of the application?

5. What is your level of satisfaction with the application?

Technology Related

1. How integrated is the application or its data with other applications?

2. Is the application architecture currently on the EA roadmap?

3. To what extent can the application accommodate expansion without introducing additional technical complexity and/or significant cost?

4. To what extent can the application accommodate changes or enhancements without introducing additional technical complexity and/or significant cost?

5. Does the application meet SOM data security compliance requirements?

6. What is the estimated annual cost of maintenance (planned)?

7. What is the application platform/technology?

8. Are there enough developers in the current marketplace with the skill required to support the system?

Answers to the questions are assigned an associated point value. Two scores are generated which are used to evaluate each application's business and technology characteristics. The combined scores are plotted on the TIME map to illustrate the business and technological value of each application.
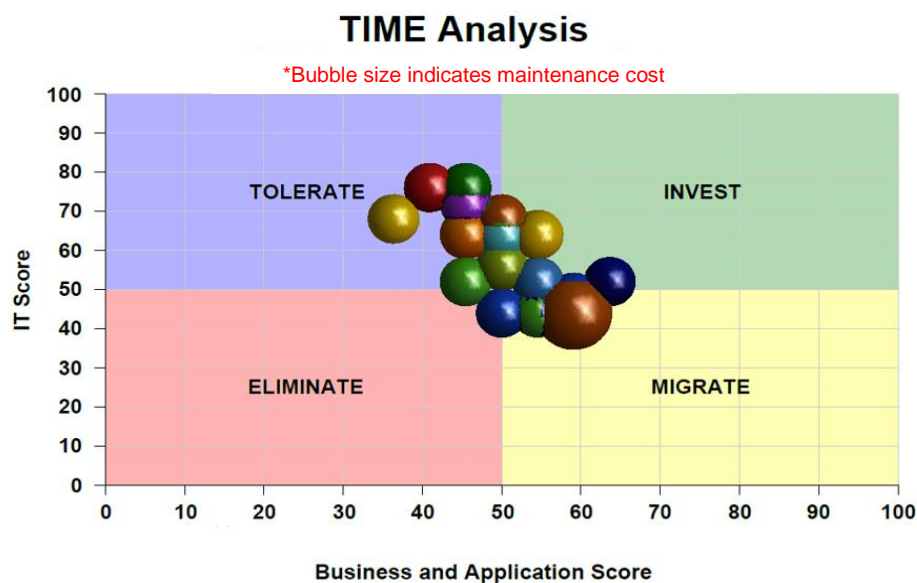
The four quadrants of the TIME map are:

- Tolerate - High technical quality but low business value.

- Invest - High business value and good technical quality.

- Migrate - High business value but low technical quality.

- Eliminate - Low business value and low technical quality.
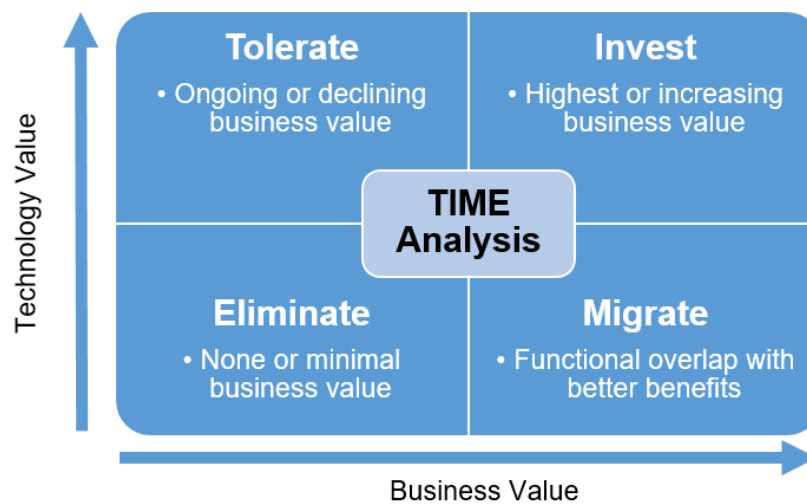
The following is a generic example of a completed TIME map analysis:

Source: The OAG prepared this exhibit using information provided by the DTMB EPMO.

MODERNIZATION OF LEGACY IT SYSTEMS
Department of Technology, Management, and Budget

Annual Call for Projects and Budget Request Process Flow Chart
As of February 2018

Call for Projects and Budget Process
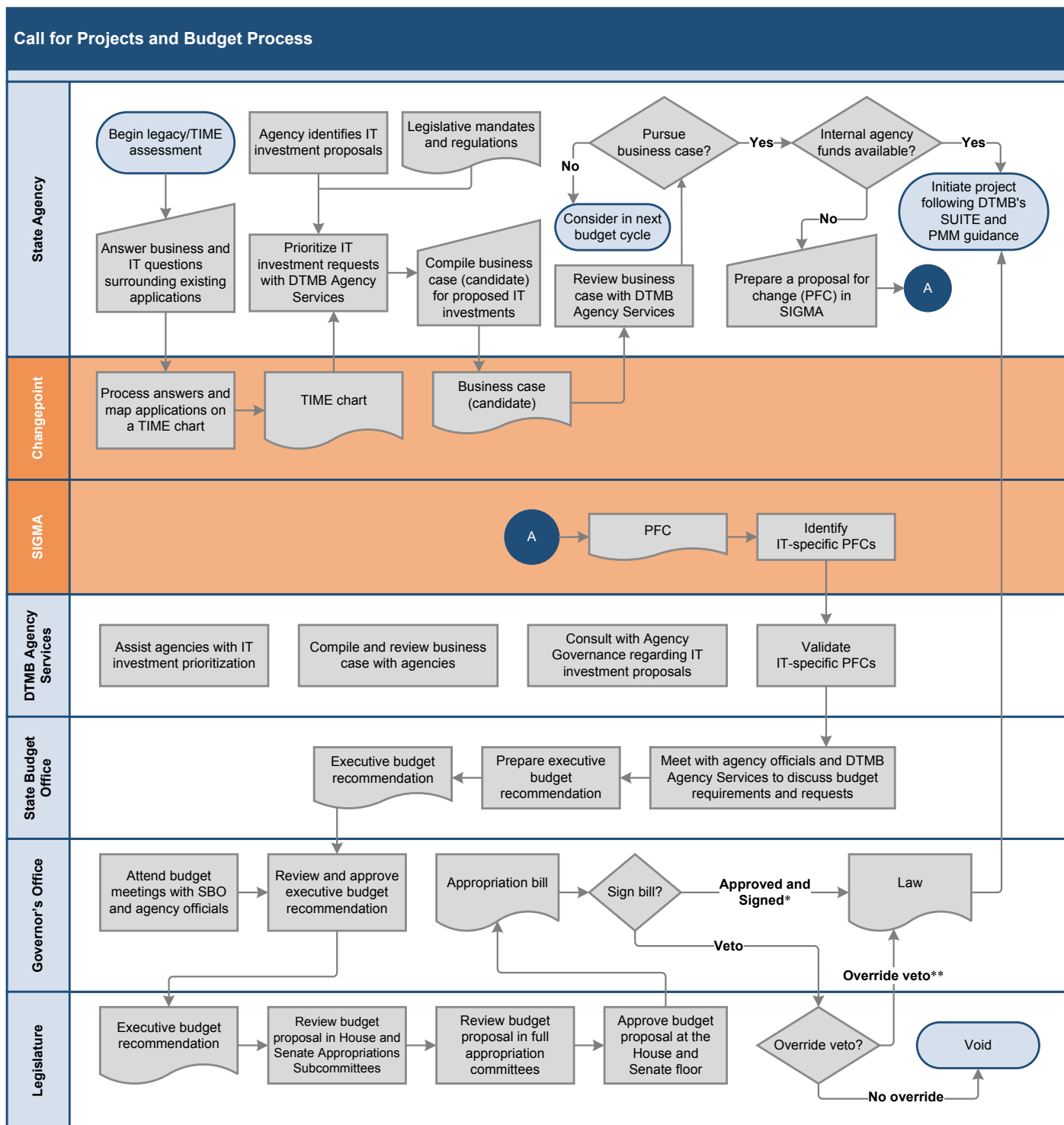
*   A signed bill is filed with the Secretary of State for a Public Act number.
**   A 2/3 vote is needed by both the House of Representatives and the Senate to override a veto.
Orange section denotes automated system processes.

Source: The OAG created this flow chart using data from DTMB and SBO.

DESCRIPTION

In its *2008 Survey of the States: Digital States at Risk! Modernizing Legacy Systems*, the National Association of State Chief Information Officers (NASCIO) reported that the modernization of legacy IT systems is a significant financial, technical, and programmatic challenge to states' ability to deliver services to citizens and conduct day-to-day business. According to NASCIO, many state information systems have become obsolete, difficult to secure, and costly to operation and support. The report concluded that, without investments in legacy system renovation, modernization, or replacement, the ability of states to operate as modern organizations and serve their citizens is at risk.

In 2012, DTMB initiated the Michigan Legacy Application Modernization Planning (MiLAMP) methodology. MiLAMP is an enterprise portfolio management* methodology that is composed of tools, templates, and processes to address all phases of the State's legacy modernization efforts. MiLAMP is based on a mixture of best practices from the Project Management Institute's *A Guide to Project Management Body of Knowledge,* Carnegie Mellon's *Capability Maturity Model Integration*, and MDOT.

According to DTMB, the expected benefits of MiLAMP include a standard, Statewide means to modernize aging applications, leverage new technologies, consolidate, collaborate, and prioritize while providing better service to citizens and local governments at significant savings.

The following diagram explains the MiLAMP investment management process:

* See glossary at end of report for definition.

DTMB has continued to refine MiLAMP since its initial development. Based on feedback from State agencies, DTMB integrated MiLAMP into its State Unified Information Technology Environment (SUITE) PMM; Changepoint (i.e., the State's enterprise project and portfolio management tool); and Call for Projects process.

DTMB, SBO, and State agencies have a shared responsibility for ITIM processes. Section 18.441 of the *Michigan Compiled Laws* requires all executive branch IT budget requests to be submitted to SBO and the State Chief Information Officer for joint review. The Section also states that only those proposals that fit into the overall strategic IT management plan and provide a reasonable ROI will be recommended for funding consideration. Specifically:

- The objective of DTMB's IT Strategy Group is to oversee and deliver all investment decisions, including the overall strategic direction of the enterprise. The Group is tasked with, and accountable for, ensuring that technology services deliver business value and that expected benefits from investments are fully realized.

- DTMB's IT Steering Committee is responsible for ensuring the successful progress of technology projects, services, and investments at the strategic level. Also, the Committee provides oversight of the annual investment management and Call for Projects process.

- The DTMB Enterprise Portfolio Management Office (EPMO) provides guidance for ITIM practices. EPMO is responsible for the administration of Changepoint, which is the State's system for tracking and monitoring ITIM data.

- The DTMB Enterprise Architecture and Network Strategies Division is responsible for identifying outdated and emerging technologies in the EA Technology Roadmaps. The division director co-chairs DTMB's Technology Council, which is responsible for aligning the EA Technology Roadmaps and IT standards with business strategies.

- DTMB Agency Services acts as the liaison between DTMB and the executive branch agencies. Agency Services assists agencies with ITIM practices, including the identification of legacy systems and business case preparation.

- SBO evaluates agency budget requests, including IT investment requests and provides funding recommendations to the Governor's Office.

- State agencies share responsibility with DTMB for the selection, control, and monitoring of their IT investments.

AUDIT SCOPE, METHODOLOGY, AND OTHER INFORMATION

AUDIT SCOPE

To examine the program and other records related to the modernization of legacy IT systems. 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 findings and conclusions based on our audit objectives.

PERIOD

Our audit procedures, which included a preliminary survey, audit fieldwork, report preparation, analysis of agency responses, and quality assurance, generally covered March 1, 2017 through June 30, 2018. Changepoint data used to report on the status of legacy systems and for our business case analysis represents a point in time and was obtained on May 4, 2017 and May 8, 2017, respectively.

METHODOLOGY

We conducted a preliminary survey of DTMB's activities related to legacy systems and ITIM processes in order to establish our audit objectives, scope, and methodology. During our preliminary survey, we:

- Obtained an understanding of DTMB's definition of legacy.

- Obtained an understanding of DTMB's MiLAMP processes.

- Interviewed DTMB management, SBO management, and contractors responsible for monitoring ITIF projects and the State's annual Call for Projects process.

- Reviewed best practices for ITIM management. This included the GAO's ITIM Framework and the IT Governance Institute's VAL IT. We also reviewed Control Objectives for Information and Related Technology* (COBIT) control objectives, GAO audits, NASCIO research and guidance, other IT investment best practices.

OBJECTIVE #1

To assess the effectiveness of DTMB's efforts to optimize the maturity of the State's ITIM processes.

To accomplish this objective, we:

- Interviewed DTMB and SBO management to obtain an understanding of enterprise ITIM practices.

See glossary at end of report for definition.

- Judgmentally selected 4 of 17 State agencies to obtain an understanding of their ITIM practices.

- Mapped DTMB's ITIM practices, using the GAO's ITIM Framework, to the Framework's maturity model. We mapped DTMB's practices as of September 30, 2017. We did not assess the operating effectiveness of DTMB's practices.

- Reviewed business cases for 38 of 361 randomly sampled projects for compliance with DTMB's business case requirements. The projects had projected start dates in fiscal years 2016 and 2017. We could not project our results to the population because of the unique nature of the projects.

- Requested documentation to support ROI and TCO calculations for 8 of 361 judgmentally selected projects. The projects had projected start dates in fiscal years 2016 and 2017.

- Evaluated DTMB's ITIM metrics.

OBJECTIVE #2

To report on the status of the State's legacy systems.

To accomplish this objective, we:

- Analyzed Changepoint data describing the characteristics of existing information systems.

- Surveyed State agencies regarding their legacy systems (see Exhibit #1 and Exhibit #2).

- Identified ITIF legacy modernization projects.

- Interviewed DTMB Agency Services management to obtain an understanding of State agencies' modernization efforts related to applications running on the Unisys mainframe.

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 4 findings and 4 corresponding recommendations. DTMB's preliminary response indicates that it agrees with all of the recommendations.

The agency preliminary response that follows 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 within 60 days after release of the audit report to the Office of Internal Audit Services, State Budget Office. Within 30 days of receipt, the Office of Internal Audit Services 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.

PRIOR AUDIT FOLLOW-UP

Following is the status of the reported findings from our August 2008 performance audit of Information Technology Investment Management Practices, Michigan Department of Information Technology (084-0595-07):

Prior Audit Finding Number	Topic Area	Current Status	Current Finding Number
1a	Enterprise Level Management Structure	Rewritten*	1
1b	IT Investment Management Framework	Rewritten	1
1c	Planning Documents	Rewritten	1
1d	Policies, Procedures, and Practices	Rewritten	2
2a	Business Cases	Rewritten	3
2b	Utilization of State's Accounting System	Not in scope of this audit	
2c	Criteria for Selecting and Funding IT Investments From an Enterprisewide Perspective	Complied	
3	Enterprise Investment Oversight - IT Project Performance Data	Complied	

SUPPLEMENTAL INFORMATION

Our audit report includes supplemental information presented as Exhibits #3 through #5. Our audit was not directed toward expressing a conclusion on the information in Exhibits #4 and #5. The information presented in Exhibit #3 was used to support our conclusion on Objective #1.

* See glossary at end of report for definition.

GLOSSARY OF ABBREVIATIONS AND TERMS

benchmarking	A structured approach for identifying the best practices from industry and government and comparing and adapting them to an organization's operations. Such an approach is aimed at identifying more efficient and effective processes for achieving intended results based on outstanding practices of other organizations.
business case	A structured method for organizing and presenting a business improvement proposal. Organizational decision-makers compare business cases when they are deciding to expend resources. A business case typically includes an analysis of business process performance and associated needs or problems, proposed alternative solutions, assumptions, constraints, and a risk-adjusted cost/benefit analysis.
Call for Projects	State of Michigan process for identifying new IT projects. The Call for Projects process is closely coordinated with the annual budgeting process and allows each agency to plan and prioritize its IT work and budgets each new fiscal year.
Changepoint	A project and portfolio management tool used to track project data.
Control Objectives for Information and Related Technology (COBIT)	A framework, control objectives, and audit guidelines developed by the IT Governance Institute as a generally applicable and accepted standard for good practices for controls over IT.
DOC	Department of Corrections.
DOS	Department of State.
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.
enterprise	An organization. In this audit report, "enterprise" encompasses DTMB and all other State agencies that operate information systems on the State's IT network.

enterprise architecture (EA)	An integrated framework for evolving or maintaining existing IT and acquiring new IT to achieve the organization's strategic and business goals.
Enterprise Architecture Solution Assessment (EASA)	Documents the IT architectural details of the proposed solution. The EASA identifies all key components of the solution and their position on the EA Technology Roadmaps.
Enterprise Architecture (EA) Technology Roadmap	A list of information technologies that are endorsed for use in the SOM IT environment. There is a separate list for each IT product family.
***Enterprise Value: Governance of IT Investments, The Val IT Framework* (Val IT)**	A framework developed by the IT Governance Institute that provides a comprehensive and pragmatic organizing framework that enables the creation of business value from IT-enabled investments. Val IT is designed to align with COBIT and integrates a set of practical and proven governance principles, processes, practices and supporting guidelines that help boards, executive management teams, and other enterprise leaders optimize the realization of value from IT investments.
EPMO	Enterprise Portfolio Management Office.
***Information Technology Investment Management: A Framework for Assessing and Improving Process Maturity* (ITIM Framework)**	A framework developed by the GAO that identifies and organizes into five stages of maturity 13 processes that are critical for successful IT investment. Such a maturity framework can be used to analyze an organization's investment management process or determine the maturity of its investment process. The framework provides three key capabilities: (1) a rigorous, standardized tool for internal and external evaluations of an agency's ITIM process; (2) a consistent and comprehensible mechanism for reporting the results of these assessments to agency executives and other interested parties; and (3) a road map that agencies can use for improving their ITIM processes.
IT	information technology.
ITIF	IT Investment Fund.
ITIM	IT investment management.
IT investment	The expenditure of resources on selected IT or IT-related initiatives with the expectation that the benefits from the expenditure will exceed the value of the resources expended.

IT investment board

A decision-making body, made up of senior program, financial, and information managers, that is responsible for making decisions about IT projects and systems based on comparisons and trade-offs among competing projects, with an emphasis on meeting mission goals.

IT investment portfolio

The combination of all IT assets, resources, and investments owned or planned by an organization in order to achieve its strategic mission, goals, and objectives.

LARA

Department of Licensing and Regulatory Affairs.

lean process improvement (LPI)

A methodology that provides performance excellence through analysis and redesign of processes that are customer-focused, statutorily aligned, and streamlined for effectiveness and efficiency. LPI provides a direct, hands-on approach to review aspects of each process within State government using activities that are easy to understand. Also, LPI allows teams to identify issues, evaluate customer values, grasp root causes, create ideas, measure changes, and create implementation plans for successful performance excellence.

legacy system

A system with a component that is no longer used in the SOM environment or if a component's vendor no longer provides maintenance or support.

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.

maturity model

A model of the stages through which organizations progress as they define, implement, evolve, and improve their processes. This model serves as a guide for selecting process improvement strategies by facilitating the determination of current process capabilities and the identification of the issues that are most critical to achieving quality and process improvement.

maturity stage

A well-defined evolutionary plateau toward achieving mature processes.

MDHHS

Michigan Department of Health and Human Services.

MiLAMP

Michigan Legacy Application Modernization Planning.

mission	The main purpose of a program or an entity or the reason that the program or the entity was established.
NASCIO	National Association of State Chief Information Officers.
observation	A commentary that highlights certain details or events that may be of interest to users of the report. An observation may not include the attributes (condition, effect, criteria, cause, and recommendation) that are presented in an audit finding.
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.
PMM	Project Management Methodology.
portfolio management	The combination of practices, tools, and techniques that are used to measure, control, and increase the return on individual IT investments as well as on an aggregate enterprise level.
PPM	Project Portfolio Management.
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: an opportunity for improvement within the context of the audit objectives; a deficiency in internal control that is significant within the context of the audit objectives; all instances of fraud; illegal acts unless they are inconsequential within the context of the audit objectives; significant violations of provisions of contracts or grant agreements; and significant abuse that has occurred or is likely to have occurred.
request for information	A request to the vendor community to gather information that may result in issuing an invitation to bid, request for quotation, or request for proposal.
return on investment (ROI)	A financial management approach used to explain how well a project delivers benefits in relation to its cost including the use of nominal qualitative measures.

rewritten	The recurrence of similar conditions reported in a prior audit in combination with current conditions that warrant the prior audit recommendation to be revised for the circumstances.
selection criteria	Factors identified for use by an investment review board to identify and discriminate among investments for subsequent funding.
SOM	State of Michigan.
stakeholder	An individual or group with an interest in the success of an organization in delivering intended results and maintaining the viability of its products and services. Stakeholders influence programs, products, and services.
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. SIGMA replaced the following legacy systems: Michigan Administrative Information Network Financial Administration and Control System (MAIN FACS), Data Collection and Distribution System (DCDS), Mi Time and Expense (MiTES), Buy4Michigan, and many other agency-specific systems.
strategic plan	A document used by an organization to align its structure and budget with its priorities, missions, and objectives.
succession	The process of retiring and replacing IT investments.
TBM	Technology Business Management.
TIME	Tolerate, Invest, Migrate, Eliminate.
total cost of ownership (TCO)	The sum of direct and indirect costs incurred throughout the life cycle of an asset, including acquisition, deployment, operation, support, and retirement.
U.S. Government Accountability Office (GAO)	The audit, evaluation, and investigative arm of the United States Congress. The GAO examines the use of public funds, evaluates federal programs and activities, and provides analyses, options, recommendations, and other assistance to help Congress make effective oversight, policy, and funding decisions.

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