

Office of the Auditor General
Follow-Up Report on Prior Audit Recommendations

Enterprise Data Warehouse
Department of Technology, Management, and Budget

December 2022

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

Article IV, Section 53 of the Michigan Constitution



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Report Summary

Follow-Up Report

Enterprise Data Warehouse (EDW)

Department of Technology, Management, and Budget (DTMB)

Report Number:
071-0520-14F

Released:
December 2022

We conducted this follow-up to determine whether the Department of Technology, Management, and Budget had taken appropriate corrective measures in response to the material condition noted in our August 2014 audit report.

Prior Audit Information
Finding 1 - Material condition Improvements needed to interface controls over the EDW. Agency agreed.

Follow-Up Results		
Conclusion	Finding	Agency Preliminary Response
Partially complied	Reportable condition exists. See <u>Finding 1</u> .	Agrees

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December 2, 2022

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

Dear Ms. Lange and Ms. Clark:

This is our follow-up report on the material condition (Finding 1) and corresponding recommendation reported in the performance audit of the Enterprise Data Warehouse, Department of Technology, Management, and Budget. That audit report was issued and distributed in August 2014. Additional copies are available on request or at audgen.michigan.gov.

The Department of Technology, Management, and Budget and the State Court Administrative Office provided a preliminary response to the follow-up recommendation included in this report. The *Michigan Compiled Laws* and administrative procedures require an audited agency to develop a plan to comply with the recommendations and to submit it to the State Budget Office upon completion of an audit. Within 30 days of receipt, the Office of Internal Audit Services, State Budget Office, is required to review the plan and either accept the plan as final or contact the agency to take additional steps to finalize the plan.

We appreciate the courtesy and cooperation extended to us during our follow-up. If you have any questions, please call me or Laura J. Hirst, CPA, Deputy Auditor General.

Sincerely,

A handwritten signature in black ink that reads "Doug Ringler". The signature is written in a cursive, flowing style.

Doug Ringler
Auditor General

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ENTERPRISE DATA WAREHOUSE

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INTRODUCTION, PURPOSE OF FOLLOW-UP, AND SYSTEM DESCRIPTION

INTRODUCTION

This report contains the results of our follow-up of the material condition* (Finding 1) and the corresponding recommendation reported in our performance audit* of the Enterprise Data Warehouse (EDW), Department of Technology, Management, and Budget (DTMB), issued in August 2014.

PURPOSE OF FOLLOW-UP

To determine whether DTMB had taken appropriate corrective measures to address our corresponding recommendation.

SYSTEM DESCRIPTION

The EDW is a centralized repository of historical and current data used to support State agencies' decision-making and business processes, including multiple mission critical and federally mandated applications. DTMB, in conjunction with State agencies, processes data extracted from source systems, transforms or formats the data, and loads it into the EDW. State agencies use analytical tools to query data stored on the EDW to generate State and federal reports, project State revenues, perform trend analyses, drive applications that support State programs, and detect fraud.

* See glossary at end of report for definition.

PRIOR AUDIT FINDING AND RECOMMENDATION; AGENCY PLAN TO COMPLY; AND FOLLOW-UP CONCLUSION, RECOMMENDATION, AND AGENCY PRELIMINARY RESPONSE

FINDING 1

Audit Finding Classification: Material condition.

Summary of the August 2014 Finding:

DTMB, in conjunction with State agencies, had not fully established effective interface controls* over the EDW. As a result, interfaces may not be designed to ensure that data is transferred completely, accurately, and timely from the source systems to the EDW.

Our review of interface controls for 100 judgmentally selected interfaces disclosed:

- a. DTMB, in conjunction with State agencies, had not always implemented effective interface* strategy or interface design for each EDW interface. We noted 36 of the 100 interfaces had no documentation of their interface strategy or interface design and 50 of the 100 interfaces had incomplete documentation.
- b. DTMB, in conjunction with State agencies, had not implemented effective interface reconciliation controls for 64 of the 100 interfaces tested. We noted instances in which interface activity was not logged, instances in which interface audit logs did not capture sufficient control totals, and instances in which interface control totals were sufficiently captured but no reconciliation control had been implemented to ensure that data transferred completely and accurately from the source system to the EDW.

Recommendation Reported in August 2014:

We recommended that DTMB, in conjunction with State agencies, fully establish effective interface controls over the EDW.

AGENCY PLAN TO COMPLY*

On January 21, 2015, DTMB stated:

- DTMB has updated the EDW Guidelines for Best Practices to include new recommendations for interface controls. The document's Extract, Transform, and Load (ETL) Best Practices section includes strategy, design, and reconciliation controls in accordance with U.S. Government Accountability Office's (GAO's) Federal Information System Controls Audit Manual* (FISCAM).
- DTMB is partnering with the Michigan Department of Health and Human Services* (MDHHS) to create an interface strategy and design for each MDHHS EDW

* See glossary at end of report for definition.

interface and all new tables will have documentation for interface and design. In addition, the departments will ensure effective controls are in place between the source and target systems (for control totals, record counts, hash totals, batch run totals, etc.). DTMB will also partner with MDHHS and the MDHHS data warehouse vendor to update interface documentation where gaps exist.

- The Department of Treasury, prior to the start of the audit, had identified interface controls as an area for improvement and had begun work with DTMB to ensure that control reports are available and legacy (mainframe) data is transferred completely, accurately, and timely to the data warehouse.
- DTMB, in conjunction with Treasury, has developed a reconciliation process that will be applied across all interfaces moving data to Treasury's EDW environment.
- DTMB, in conjunction with State agencies, will comply with the recommendation by June 30, 2015.

FOLLOW-UP CONCLUSION

Partially complied. A reportable condition* exists.

DTMB updated the EDW Guidelines for Best Practices to provide additional guidance to State agencies loading data into the EDW. This document provides guidance for agencies to implement and use standardized methodologies for the EDW. Specifically, it identifies industry best practices applicable to the ETL process for agencies loading data into the EDW. DTMB Agency Services reviews this document yearly and documents updates as needed to meet compliance requirements and current industry best practices. DTMB informed us State agencies loading data into the EDW agree to align their practices with the EDW Guidelines for Best Practices and State of Michigan technical standards related to system development to the extent systems allow.

Our follow-up noted DTMB and State agencies had:

- a. Partially complied.

According to FISCAM, interface strategy and design help keep the data synchronized between the source and target systems. We noted DTMB and State agencies did not have documentation of their interface strategy or interface design for 1 (4%) of 26 interfaces and had incomplete documentation for 10 (38%) of 26 interfaces.

* See glossary at end of report for definition.

The following table summarizes the testing results by State agency:

State Agency	Number of Interfaces		
	Reviewed	No Strategy or Design Documentation	Incomplete Strategy or Design Documentation
Michigan Department of Agriculture and Rural Development (MDARD)	2	0	2
MDHHS - Health Services	9	0	5
MDHHS - Human Services	5	0	1
State Court Administrative Office (SCAO)	2	1	1
Treasury	8	0	1
Total	26	1	10

Complete strategy and design documentation help DTMB and State agencies ensure data stays consistent between source and target systems.

b. Substantially complied.

According to FISCAM, interface reconciliation controls between the source and target systems, such as the use of control totals, record counts, or hash totals, help ensure data transfers completely and accurately between the source and target systems. We noted State agencies did not have complete reconciliation controls for 4 (17%) of 23 interfaces. Specifically, we noted instances in which the interface audit logs did not capture record counts from both the source and target systems. The following table summarizes the testing results by State agency:

State Agency	Number of Interfaces	
	Reviewed	Incomplete Reconciliation Controls
MDARD	2	2
MDHHS - Health Services	7	0
MDHHS - Human Services	5	0
SCAO	2	2
Treasury	7	0
Total	23	4

Complete interface reconciliation controls help State agencies ensure data transferred from source systems into the EDW is complete, accurate, and reliable.

**FOLLOW-UP
RECOMMENDATION**

We again recommend that DTMB, in conjunction with State agencies, fully establish effective interface controls over the EDW.

**FOLLOW-UP
AGENCY
PRELIMINARY
RESPONSE**

DTMB provided us with the following response:

For part a., Treasury, MDHHS, DTMB, and MDARD agree that interfaces should be documented based on business needs.

Treasury, MDHHS, DTMB, and MDARD will continue to update the documentation for long established interfaces to the modern documentation methodologies based on business needs, business prioritization, and available resources.

DTMB will review and update the EDW Best Practices Guidelines to reference appropriate State of Michigan Standards.

For part b., MDARD agrees that reconciliation interface controls should be more fully documented based on business needs. MDARD will continue to update the documentation based on business needs, business prioritization, and available resources.

MDARD provides their own IT support for MDARD's EDW processes. In addition, the SCAO is not an executive branch agency and as such the SCAO provides their own IT support for the SCAO's EDW processes. As such, DTMB Agency Services does not provide IT support to the MDARD or SCAO EDW.

SCAO provided us with the following response:

The State Court Administrative Office (SCAO) agrees with parts 1a and 1b of the follow-up conclusion. SCAO notes that the samples selected, when combined, represent only 1.01% of data loaded to the Judicial Data Warehouse (JDW) and neither sample included trial court system interfaces. During the audit, SCAO developed strategy and design documentation and demonstrated the interfaces reconciled for both samples. SCAO confirms its processes ensure data transferred from source systems into the JDW are consistent and reliable. SCAO will add a section to its strategy and design documentation to resolve 1a above, as well as continue periodic standards review meetings to assess documentation and reconciliation for continued and improved alignment with the EDW Guidelines for Best Practices in identified areas.

FOLLOW-UP METHODOLOGY, PERIOD, AND AGENCY RESPONSES

METHODOLOGY

We reviewed DTMB's corrective action plan, new and updated policies, and strategy, design, and reconciliation controls for the EDW. Specifically, for Finding 1, we:

- Obtained and reviewed DTMB's EDW Guidelines for Best Practices provided to State agencies loading data into the EDW.
- Obtained the current population of agencies' system interfaces loading data into the EDW.
- Selected a random sample of 26 system interfaces loading data into the EDW, including 2 from MDARD, 14 from MDHHS, 2 from SCAO, and 8 from Treasury. We:
 - Reviewed the strategy and design for the 26 interfaces.
 - Reviewed the reconciliation controls for 23 of the 26 interfaces sampled. We did not review 3 interfaces sampled, 2 MDHHS and 1 Treasury, because the interfaces had not run during our audit period.
- Obtained and reviewed interface documentation and logs to determine whether:
 - Interface strategy and design documentation existed for these interfaces and contained the elements recommended by industry best practices.
 - Interface reconciliation controls were in place and audit logs captured sufficient information to reconcile the interfaces.

PERIOD

Our follow-up generally covered July 1, 2021 through June 30, 2022.

AGENCY RESPONSES

Our follow-up report contains 1 recommendation. DTMB's and SCAO's preliminary response indicates they agree with the recommendation.

The agency preliminary response following the follow-up recommendation in our report was taken from the agencies' written comments and oral discussion at the end of our fieldwork. Section 18.1462 of the *Michigan Compiled Laws* and the State of Michigan Financial Management Guide (Part VII, Chapter 4, Section 100) require an audited agency to develop a plan to comply with the recommendations and to submit it to

the State Budget Office upon completion of an audit. Within 30 days of receipt, the Office of Internal Audit Services, State Budget Office, is required to review the plan and either accept the plan as final or contact the agency to take additional steps to finalize the plan.

GLOSSARY OF ABBREVIATIONS AND TERMS

agency plan to comply	The response required by Section 18.1462 of the <i>Michigan Compiled Laws</i> and the State of Michigan Financial Management Guide (Part VII, Chapter 4, Section 100). The audited agency is required to develop a plan to comply with Office of the Auditor General audit recommendations and to submit the plan to the State Budget Office upon completion of an audit. Within 30 days of receipt, the Office of Internal Audit Services, State Budget Office, is required to review the plan and either accept the plan as final or contact the agency to take additional steps to finalize the plan.
DTMB	Department of Technology, Management, and Budget.
EDW	Enterprise Data Warehouse.
ETL	Extract, Transform, and Load.
Federal Information System Controls Audit Manual (FISCAM)	A methodology published by the U.S. Government Accountability Office (GAO) for performing information system control audits of federal and other governmental entities in accordance with <i>Government Auditing Standards</i> .
interface	The structured exchange of data between two computer applications that reside on the same or different computer system and the same or different physical environment.
interface controls	Controls that ensure the accurate, complete, and timely processing of data exchanged between information systems.
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.
MDARD	Michigan Department of Agriculture and Rural Development.
Michigan Department of Health and Human Services (MDHHS)	In April 2015, after our performance audit, Executive Order No. 2015-45 created MDHHS and abolished the Department of Human Services and Department of Community Health.

performance audit	An audit that provides findings or conclusions based on an evaluation of sufficient, appropriate evidence against criteria. Performance audits provide objective analysis to assist management and those charged with governance and oversight in using the information to improve program performance and operations, reduce costs, facilitate decision-making by parties with responsibility to oversee or initiate corrective action, and contribute to public accountability.
reportable condition	A matter that, in the auditor's judgment, is less severe than a material condition and falls within any of the following categories: a deficiency in internal control; noncompliance with provisions of laws, regulations, contracts, or grant agreements; opportunities to improve programs and operations; or fraud.
SCAO	State Court Administrative Office.
Treasury	Department of Treasury.



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