

Secretary of State Audit Report

Kate Brown, Secretary of State

Gary Blackmer, Director, Audits Division



Oregon Department of Transportation: TEAMS Computer System is Reliable, but Some Controls Need Strengthening

Summary

The Transportation Environment Accounting and Management System (TEAMS) is the Oregon Department of Transportation's (department) main financial accounting computer system. During fiscal year 2012, TEAMS processed approximately \$1.3 billion in expenditures. TEAMS transfers summary level transactions to the Statewide Financial Management Application for financial reporting purposes. The purpose of this audit was to identify and evaluate TEAMS computer controls.

We found the department has controls in place to ensure TEAMS transactions process correctly and outputs occur as intended. However, procedures for updating selected reference tables and for authorizing and verifying certain financial transactions, such as journal entries, should be improved. These weaknesses could adversely affect how some automated controls operate or how transactions are posted.

The department should also improve processes for managing changes to TEAMS computer code. Specifically, staff does not always perform quality assurance reviews or code comparisons for some changes, monitor access to TEAMS code, or ensure sufficient documentation of changes is made and retained. These weaknesses increase the risk that unauthorized, erroneous, or untested changes to TEAMS could occur and go undetected.

Although the department has automated routines to back up system and data files, we identified three files that were not included in the backups. We also noted that department staff have not fully tested their processes for completely restoring the system.

Department security efforts provided reasonable assurance that TEAMS and its data were protected from unauthorized use, but we identified opportunities for these controls to be improved.

Agency Response

The agency response is attached at the end of the report.

Background

The mission of the Oregon Department of Transportation (department) is to provide a safe, efficient transportation system that supports economic opportunity and livable communities for Oregonians. The department's Central Services Division provides a range of services for the entire department. Its Financial Services branch supports integrated financial and accounting processes, and its Information Systems branch manages technology services.

The department's Transportation Environment Accounting and Management System (TEAMS) serves as its main financial accounting system. The department acquired TEAMS in 1983 and has since made significant modifications to the system to support its business needs.

TEAMS processes and reports financial and managerial information, and processes payments, billings, and receipts. It also tracks costs for individual projects. Users throughout the department enter transactions into TEAMS. In addition, the system receives input through automated and manual interfaces from other computer systems that the department uses to track projects, equipment, contracts, and tax revenue.

TEAMS transactions interface at a summary level with the Statewide Financial Management Application (SFMA) for financial reporting purposes. During fiscal year 2012, TEAMS processed approximately \$1.3 billion in expenditures that were transferred to SFMA.

The Financial Services branch is responsible for managing TEAMS, and the Transportation Application Division is responsible for providing technical support. TEAMS operates on a mainframe located at the Department of Administrative Services' data center.

The purpose of this audit was to identify and evaluate TEAMS computer controls to support the annual financial audit at the department.

Audit Results

The integrity of TEAMS data depends on automated and manual controls governing transaction input, processing and output. These controls, however, are reliable only when security measures are in place to protect the system and when changes to program code are strictly controlled.

During our audit, we evaluated key computer controls and found that transactions remain complete, accurate and valid during application input, processing and output, but procedures relating to selected reference tables and authorizing and verifying certain transactions should be improved. In addition, processes for making system changes should be improved and backup and recovery strategies need attention. We also found that system data is protected against unauthorized use, disclosure, modification, damage or loss.

Transactions Remain Complete, Accurate and Valid During Application Input, Processing and Output

Effective application controls include both manual and automated processes to ensure only complete, accurate and valid information is entered into a computer system; data integrity is maintained during processing; and system outputs conform to anticipated results. Controls should also be in place to timely detect and correct errors that may occur during transaction input and processing.

The department has implemented a variety of application controls to ensure TEAMS processes transactions correctly and outputs occur as intended. Some of these controls include:

- Automated routines require payment transactions to be entered by one user and released by another before processing.
- System edits validate input data to ensure they are complete and conform to required formats.
- Processing functions automatically suspend erroneous transactions until identified problems are resolved or overridden.
- Department personnel perform periodic reconciliations of interface inputs and outputs to ensure they are complete and valid.
- Department staff monitor transaction streams to ensure timely processing.

These controls provide reasonable assurance that transactions processed through TEAMS are complete, accurate and valid. However, the department could improve processes for updating TEAMS reference tables, and authorizing and verifying certain financial transactions.

System Table Maintenance Procedures Should be Improved

TEAMS uses multiple reference tables to define valid coding for transactions. These tables include a wide range of data elements, from high-level identifiers such as agency numbers to more detailed elements

used to identify a specific piece of equipment. Some tables contain a small number of records that seldom change. Other tables, such as the Expenditure Account table, contain numerous records including details that must be changed frequently to accurately reflect how specific projects or accounts can be charged.

Generally accepted controls for information systems indicate that table updates should be strictly controlled by ensuring changes are approved by the data owner prior to entry and independently validated to ensure changes are accurately performed. In addition, documentation of changes should be retained and the configuration of reference tables should also be periodically reevaluated to ensure their contents remain valid.

The department's Financial Services branch is ultimately responsible for developing and maintaining the integrity of all system data tables. Through department policy, the Chief Financial Officer delegates specific responsibility for maintaining the various system reference tables to business process owners and co-owners. In addition, this policy prescribes procedures for requesting, approving, validating, authorizing and documenting changes to system tables. When followed, these procedures provide reasonable assurance that table updates will be appropriately controlled.

We noted that staff do not always follow the department's procedures or document their actions when changing some reference tables. Specifically, some process owners allow users to update tables without formally requesting or properly documenting and archiving details of the changes. We also noted that the department sometimes utilizes automated system routines to enforce its policy requiring table changes to be entered and reviewed by separate individuals. However, management declined to implement this control for some tables, such as the Expenditure Account table.

Information contained in system reference tables affects how TEAMS operates. As such, introduction of incorrect information to tables may adversely affect how some automated controls operate or how transactions are posted. In addition, since table information is generally applied to system processes or classes of transactions, errors contained in system tables could likely impact a broad scope of transactions. For example, incorrect coding in the Expenditure Account detail record could result in multiple transactions being posted to an incorrect accounting fund.

Processes to approve and validate certain financial transactions need attention

To help ensure the integrity of information processing, inputs should be approved and validated before they are accepted for processing by information systems. In addition, outputs should be reviewed to ensure the integrity of production and transaction processing.

For payment transactions, the department utilizes automated system routines to require entries to be reviewed and approved by separate individuals prior to final processing. However, we noted that they do not utilize these same controls for other important transactions, such as revenue and journal entries. Although staff manually approve these transactions prior to entry, department staff do not subsequently verify the entries were correctly entered into TEAMS or whether additional unauthorized changes were made.

While the above controls provide reasonable assurance that payment transactions are approved and validated, not using these controls for journal entries and revenue postings increases the risk for errors to occur. Because individual revenue and journal entries may represent tens of millions of dollars, undetected errors could have a significant negative effect on the department's financial statements.

Processes for Making System Changes Should be Improved

Mainframe computer programs are generally written using a programming language such as Cobol. These languages allow programmers to write statements, referred to as source code, that represent the actions a programmer wants the computer to take. Source code must be translated or compiled into a computer-readable format known as object code before it may be used for processing.

Generally accepted computer control standards indicate that program source and object code should be strictly managed to ensure only tested and approved modifications are implemented. As such, access to code should be strictly limited and monitored. Proposed changes to code should also be independently tested and compared to the latest version of authorized code to ensure only appropriate modifications are made.

The department's procedures for managing modifications to TEAMS include formal request, evaluation, and authorization of proposed changes; programmer and business user testing of modifications; and approval of completed code changes prior to promoting them to production.

These procedures address important aspects of managing changes to system code. However, they do not adequately address some critical control elements. In addition, staff do not always follow best practices or the department's prescribed procedures. Specifically:

- Changes to TEAMS code are not always subjected to quality assurance reviews or code comparisons to ensure only requested changes are made and that they conform to programming standards.
- Access to code is not monitored to detect whether any unauthorized changes are made outside of the approved process.
- Staff does not always adequately document or retain change requests, approvals, or test results for changes to code.

Collectively, these weaknesses increase the risk that staff could introduce unauthorized, erroneous, or untested changes to TEAMS. This could result in disruptions in processing, introduction of security weaknesses, or inaccurate financial reporting.

Backup and Recovery Strategies Need Attention

Organizations should ensure that usable backups of information systems are regularly performed in accordance with a defined backup strategy. This strategy should ensure all critical files are copied as frequently as necessary to meet business requirements and securely stored at an off-site location. In addition, disaster recovery agreements, procedures, and plans should be well-defined to facilitate proper and timely system reconstruction. Recovery plans should also be tested periodically to ensure they will function as planned.

We reviewed the department's backup and recovery procedures and found that they did not provide reasonable assurance that TEAMS could be timely restored in the event of a disaster. The department has automated routines to back up system files and data, but we noted that three files that should be backed up were not included in the backup jobs. In addition, staff indicated that they developed automated routines to restore the system and data, but have never tested them.

These weaknesses exist in part because the department has not established a process for ensuring its backup strategies are complete and effective. Delays in restoring computer systems after a disaster could negatively impact the department's ability to provide mission critical services. Failure to successfully and timely restore system data may result in loss of data, untimely processing of transactions, or inaccurate financial reporting.

System Data is Protected Against Unauthorized Use, Disclosure, Modification, Damage or Loss

One of our objectives was to determine whether TEAMS was protected against unauthorized use, disclosure, modification, damage, or loss. To achieve this objective, we evaluated logical access controls the department used to secure TEAMS from unauthorized use.

Overall, we found that the department's security efforts provide reasonable assurance that TEAMS was protected, but we identified opportunities for existing controls to be improved. Because of the sensitive nature of system security, we communicated additional details regarding our specific findings and recommendations regarding this matter to the department in a confidential letter in accordance with ORS 192.501 (23), which exempts such information from public disclosure.

Recommendations

We recommend that department management:

- Take actions to ensure that all changes to TEAMS reference tables are properly requested, independently approved, and documented, and that details of these changes are appropriately retained.
- Utilize available system routines or implement appropriate compensating controls to ensure that all table changes, revenue postings, and journal entries are independently reviewed and approved prior to their release for final processing.
- Ensure programming staff follow existing procedures for requesting, evaluating, testing, approving and documenting all modifications to TEAMS computer code.
- Require all TEAMS coding changes to undergo a quality assurance review, including a code comparison, prior to their implementation.
- Monitor all access to TEAMS computer code to further ensure unauthorized changes do not occur and go undetected.
- Develop a more comprehensive backup and restoration strategy to ensure all important TEAMS files are routinely backed up and that restoration strategies are periodically tested.
- Implement the recommendations included in our confidential management letter.

Objectives, Scope and Methodology

The purpose for this audit was to identify and evaluate computer controls associated with the department's Transportation Environment Accounting & Management System (system) and its interfaces with other systems. Our audit objectives were to determine whether information system controls governing the department's TEAMS application provided reasonable assurance that:

1. Transactions remain complete, accurate and valid during application input, processing and output.
2. Changes to computer code are managed to ensure integrity of the system and data.
3. System files are appropriately backed up and can be timely restored in the event of a disaster or major disruption.
4. The system is protected against unauthorized use, disclosure, modification, damage or loss.

The scope of this audit includes information system controls in place at the time of our audit. We obtained and tested TEAMS data from July 1, 2011 through December 31, 2012.

We conducted interviews with department personnel and observed department operations and processes. In addition, we examined technical documentation relating to TEAMS and its architecture and operations.

To evaluate controls over processing of financial transactions in TEAMS, we:

- examined documentation that described TEAMS processing procedures;
- examined department training manuals and financial standards that defined the use of TEAMS to its employees;
- interviewed department employees regarding controls over processing of TEAMS transactions;
- observed controls followed for collection of revenue and reconciliation of different types of payroll entries; and
- tested whether critical reconciliations of data were performed.

We also tested transaction data from July 2011, through December 2012, for various characteristics. For example, we tested whether:

- required fields were included as defined in TEAMS tables;
- coding of critical system data elements were appropriate based on values defined in TEAMS tables;
- transactions were processed timely following input into TEAMS;
- payments to "dummy vendors" met the requirements of department standards; and
- transactions requiring release prior to final processing had evidence of separate approval in the audit trail.

To evaluate controls over the update of supporting TEAMS tables, we examined financial standards manuals and interviewed department managers. We also reviewed table data that included the most recent change to table values to evaluate how they had been entered, and evaluated logical access information associated with table changes. We tested a selection of system table changes against the written and stated requirements.

To evaluate controls over automated interfaces of transaction data from external systems to TEAMS, we examined system documentation, evaluated how interfaced transactions were identified and tracked, and reviewed logical access information associated with how interfaces were identified.

To evaluate program change management controls, we:

- reviewed the department's change management policies and procedures;
- interviewed department managers about how changes were performed in practice;
- reviewed logical access to file locations; and
- evaluated whether sufficient supporting documentation was available to demonstrate control practices were followed.

To determine whether TEAMS could be restored in the event of a disaster, we reviewed backup schedules and examined disaster recovery plans and restoration procedures. We also compared the list of files in TEAMS production region to the files identified on the backup schedules to determine whether all required files were being backed up.

Our review of security controls was restricted to analysis of logical access controls related to TEAMS. To evaluate these controls, we:

- evaluated the methods by which users were provided access to transactions, including review of associated system documentation and how access was requested, granted, and closed;
- tested whether selected users' access matched requests;
- tested whether terminated employees had their access removed from TEAMS; and
- evaluated segregation of duties policies and practices.

Because of its sensitive nature, we communicated detailed information relating to logical access findings and recommendations to the department under separate cover in accordance with ORS 192.501 (23), which exempts sensitive information from public disclosure.

We used the IT Governance Institute's publication, "Control Objectives for Information and Related Technology," (COBIT), and the United States Government Accountability Office's publication "Federal Information System Controls Audit Manual" (FISCAM) to identify generally accepted control objectives and practices for information 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.



Oregon

John A. Kitzhaber, M.D., Governor

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August 15, 2013

Gary Blackmer, Director
Oregon Secretary of State, Audits Division
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Dear Mr. Blackmer,

Thank you for the opportunity to review the draft report titled "*Oregon Department of Transportation: TEAMS Computer System is Reliable, but Some Controls Need Strengthening.*" ODOT agrees with the report contents and recommendations and is committed to resolving all findings. The following describes our concurrence with each of the recommendations:

Recommendation:

Take actions to ensure that all changes to TEAMS reference tables are properly requested, independently approved, and documented and that detail of these changes are appropriately retained.

ODOT Response:

ODOT agrees with this recommendation. ODOT Financial Services Branch and those business offices delegated responsibility for maintaining reference tables will take those actions necessary to ensure that all changes to TEAMS reference tables are properly requested, approved, documented and retained according to established policies and procedures.

Recommendation:

Utilize available system routines or implement appropriate compensating controls to ensure that all table changes, revenue postings, and journal entries are independently reviewed and approved prior to their release for final processing.

ODOT Response:

ODOT agrees with this recommendation. ODOT Financial Services Branch and Information Systems Branch management will utilize available system routines, where appropriate, to ensure that all table changes, revenue postings, and journal entries are independently reviewed and approved prior to their release for final processing or develop compensating controls to validate the accuracy of all table changes, revenue postings, and journal entries.

Recommendation:

Ensure programming staff follow existing procedures for requesting, evaluating, testing, approving and documenting all modifications to TEAMS computer code.

ODOT Response:

ODOT agrees with this recommendation. ODOT Information Systems Branch management will review and follow existing procedures for requesting, evaluating, testing, approving and documenting all modifications to TEAMS computer code.

Recommendation:

Require all TEAMS coding changes to undergo a quality assurance review, including a code comparison, prior to their implementation.

ODOT Response:

ODOT agrees with this recommendation. ODOT Information Systems Branch management will develop processes to ensure all TEAMS coding changes to undergo a quality assurance review, including a code comparison, prior to their implementation.

Recommendation:

Monitor all access to TEAMS computer code to further ensure unauthorized changes do not occur and go undetected.

ODOT Response:

ODOT agrees with this recommendation. ODOT Information Systems Branch management will develop processes to monitor all access to TEAMS computer code to further ensure unauthorized changes do not occur and go undetected.

Recommendation:

Develop a more comprehensive backup and restoration strategy to ensure all important TEAMS files are routinely backed up and that restoration strategies are periodically tested.

ODOT Response:

ODOT agrees with this recommendation. ODOT Information Systems Branch management in working with the staff at the State Data Center will develop a more comprehensive backup and restoration strategy to ensure all important TEAMS files are routinely backed up and that restoration strategies are periodically tested.

I want to thank the staff in the Audits Division who worked on this audit. We appreciated their professionalism and the collaborative manner in which this audit was performed.

Sincerely,



Clyde Saiki
Central Services Administrator

About the Secretary of State Audits Division

The Oregon Constitution provides that the Secretary of State shall be, by virtue of her office, Auditor of Public Accounts. The Audits Division exists to carry out this duty. The division reports to the elected Secretary of State and is independent of the Executive, Legislative, and Judicial branches of Oregon government. The division audits all state officers, agencies, boards, and commissions and oversees audits and financial reporting for local governments.

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The courtesies and cooperation extended by officials and employees of the Oregon Department of Transportation during the course of this audit were commendable and sincerely appreciated.