

Secretary of State AUDIT REPORT

Report No. 2002-33 • October 1, 2002

Oregon State Lottery Commission: Video Lottery System Application Controls Review



Bill Bradbury, Secretary of State
Cathy Pollino, Director, Audits Division

Summary

PURPOSE

The purpose of our audit was to determine whether the Oregon State Lottery Commission's (Lottery) information technology controls over the Video Lottery System (system) provided reasonable assurance that:

- System data remained complete, accurate, and valid.
- Processes for acquiring and maintaining the system were reasonably controlled.
- System services could be restored in a timely manner in the event of a major disruption.
- System programs and data were appropriately safeguarded against unauthorized use, disclosure or modification, damage or loss.

RESULTS IN BRIEF

We concluded that application controls were sufficient to provide reasonable assurance that data would remain complete, valid, and accurate through the various system processes.

Controls for acquiring information technology (IT) solutions and managing contracted services, however, needed improvement. Specific opportunities for growth included system testing and acceptance, and contract administration. As a result, Lottery incurred avoidable costs totaling more than \$264,000.

Disaster recovery and contingency planning for the system was also inadequate. As a result, Lottery may not be able to continue operations or timely restore the system in the event of a major disruption. State revenues at increased risk total an estimated \$1.2 million per day should the system become inoperable.

Because of the sensitive nature of Lottery's business processes, we issued a separate report outlining specific details of our work, as well as recommendations to improve security. This confidential report was prepared in accordance with ORS 192.501 (23), which allows exemption of such information from public disclosure.

RECOMMENDATIONS

We recommend that Lottery management:

- Develop and adopt a more comprehensive system development life cycle methodology addressing outsourced or acquired systems.
- Ensure that IT contracts are managed according to best practices, including formal analysis and documentation of costs, benefits and alternatives.
- Develop a more robust and comprehensive business continuity framework.

AGENCY'S RESPONSE

Oregon State Lottery management generally agrees with the recommendations included in the report; however, it disagrees with conclusions regarding avoidable costs. The full text of Lottery's response is included at the end of this report.

AUDITOR'S COMMENT

Our audit conclusions regarding avoidable costs were based on a wide variety of evidence, including the information and views of management cited in Lottery's formal response. This evidence, including additional evidence not included in the report, may be viewed upon request.

Introduction

The Oregon State Lottery Commission (Lottery) accepted the Video Lottery System (system) in October 1998. The system was designed to maintain video lottery terminals positioned at retail locations throughout the state. Net video receipts during fiscal year 2001 were \$462 million, or approximately 59 percent of

Lottery's operating revenues. The state budgeted \$600 million in Lottery funds for the 2001-03 biennium, an increase of more than 24 percent from the prior biennium. As video revenue increases, so does the state's reliance on this revenue. As a result, the system becomes increasingly critical to the state.

The Video Lottery System was developed by an internationally

recognized corporation (contractor) that had extensive experience developing, maintaining and operating similar systems. Lottery leased the system from the contractor, who was also responsible for providing ongoing technical support, including performing program modifications and enhancements. Although Lottery outsourced these important functions, it retained responsibility

for securing and operating the system.

The system collects, tracks and reports Video Lottery terminal activities including amounts played and the prizes awarded each day. These amounts ultimately are integrated into the agency's financial reports.

Audit Results

Video Lottery System Application Controls were Adequate

Application controls include methods of ensuring that only complete, accurate, and valid data are entered in a computer system; processing performs the correct functions and results are accurate; and data are properly maintained.

We concluded that the application controls over the system provided reasonable assurance that:

- Data inputs from Video Lottery terminals were appropriately tracked.
- Ticket numbers were not validated more than once and tickets older than 365 days were not validated.
- Balancing routines provided assurance that data remain complete during processing and storage.
- Data remained valid and complete during transmission to other applications.

Processes for Acquiring IT Solutions and Managing Contract Services Needed Improvement

Generally accepted information technology practices suggest that management should define and implement a system development life cycle methodology governing the processes of developing, acquiring, implementing and maintaining computerized systems.

An appropriate system development life cycle methodology for an organization choosing to acquire a system should include specific policies and procedures to address the following control objectives:

- Identify and define user needs and requirements.
- Control acquisition processes.
- Facilitate the implementation of systems or significant modifications to systems.
- Ensure that acquired systems are appropriately maintained so that they continue to meet users needs and expectations until they are retired or replaced.

In addition, proper contract administration is essential to ensure that acquired systems are delivered according to contract terms and requirements, and outsourced services occur as anticipated.

Lottery's system development methodology did not include specific policies and procedures to guide personnel through an acquired system scenario. In addition, Lottery management did not always administer the system contract to ensure that all requirements were satisfied or that all contract monies were prudently spent. Areas needing improvement included system testing and acceptance and contract administration.

System Testing and Acceptance

Acquisition processes should include procedures for thoroughly evaluating and testing a computerized system to ensure that all components were delivered and the system functions as required. These procedures should be completed prior to formally accepting the system. Considering the complexity of Lottery's video system, it would be expected that problems be identified during acceptance testing and appropriately resolved prior to acceptance.

Lottery, however, accepted the system in October 1998, before it thoroughly tested the system. Subsequent operational and security reviews of the system identified a number of problems that should have been identified during acceptance testing, some of which caused Lottery to incur additional expenses to correct. For example, Lottery paid approximately \$107,000 to modify the system to correct some security issues that should have been identified prior to acceptance. Lottery spent another \$55,000 to correct other problems that were discovered after acceptance. A number of additional problems identified in the reviews remained unresolved at the time of our audit. Lottery will likely incur additional expenses if it chooses to correct these.

Contract Administration

An effective system development life cycle methodology for an organization choosing to acquire a system should include procedures for administering the contract governing the acquisition. This requires proper attention to contract negotiation and development to ensure that user needs and requirements are identified and defined. Approval for contracting decisions should be well documented and based on appropriate analysis of the benefits, needs and alternatives. In addition, items such as support and service levels and warranty coverage should be clearly defined. A well-defined warranty would mitigate the risk of additional costs to correct problems identified subsequent to testing and acceptance. Furthermore, effective contract administration is essential to ensure that acquired systems are delivered according to contracted terms and requirements, and outsourced services occur as anticipated.

Lottery did not establish a consensus with the contractor

regarding levels of expected support and service and warranty coverage prior to finalizing its system contract. By accepting the system as discussed in the preceding section, and by not defining support and service levels and warranty, Lottery may have limited its options for resolving contract issues.

Lottery also paid for services it did not receive. It included in its request for proposal a requirement for progressive game and download functions, but they were not included in the system that the contractor delivered.

Lottery had not received Lottery Commission approval to implement games requiring the functions. Although Lottery amended the contract to defer the addition and implementation of the functions should the Commission approve the games, the system lease payments were not reduced to reflect the change. Because the bid did not break down the value of those components, we could not estimate the amount Lottery paid for those functions it neither needed nor received. At the time of our audit, the Lottery Commission had not authorized implementation of video games requiring progressive game and download functions.

In addition, we identified an instance in which the state's contract monies were not prudently spent. This instance involved a contract addendum to upgrade the system so that it could accommodate more sophisticated games, including line games. The amendment totaled approximately \$340,000 and included substantial financial incentives if the contractor completed the project before April 2001, and disincentives if the project was completed after that date.

The contractor finished the upgrade in sufficient time to qualify for the maximum \$102,000 incentive bonus; however, Lottery had no documented or demonstrated need to have the project completed before

the due date. We thus concluded that the incentive clause was not prudent use of funds and the additional cost of the project could have been avoided through better contract negotiation.

Management's approval of this project was not based on formal analysis of the benefits, needs and alternatives. In addition, the decision was not well documented.

We recommend that Lottery management develop and adopt a more comprehensive system development life cycle methodology to specifically address the control risks associated with outsourcing or acquiring computer systems. The methodology should include specific policies and procedures to ensure that all phases of system development, acquisition, and maintenance are adequately controlled.

We also recommend that management ensure that information technology contracts are managed according to best business practices to ensure that service agreements and warranties are clearly defined, and formal analysis and documentation of costs, benefits and alternatives are performed.

Information Technology Continuity Plans were Insufficient

The purpose of business continuity planning is to enable a business to continue operations in the event of a disruption and to survive a disastrous interruption to its information services. To provide adequate assurance that this will occur requires rigorous planning and commitment of resources.

Some of the significant components of a business continuity framework include development of specific strategies to address various disaster scenarios; regular backup of system programming and data, and storage at a secure off-site location; periodic training and testing to

ensure that the plans will function when needed; and providing for alternate processing facilities for use until normal facilities can resume operations. Generally accepted information technology controls indicate that organizations leasing critical applications should also require that a copy of the system programs and documentation be placed in escrow.

Lottery's business continuity planning (plan) for the system was insufficient. The plan had not been updated or completely tested. In many instances, important documentation regarding the system, third party resources and employee responsibilities were not accurate or complete. Furthermore, the plan did not include specific strategies to address various disaster scenarios.

Prior to January 2001, Lottery's alternate processing site was not equipped to run the system. Rather, management used the system intended for that purpose as a "test system" in its main processing center. At the time of our audit, the alternate processing site had not been fully tested to ensure that it would operate appropriately should an emergency arise.

Furthermore, Lottery management had not verified whether the contractor complied with requirements to place copies of the current source code and system documentation into escrow.

Without adequate disaster recovery and contingency planning, Lottery may not be able to continue operations or timely restore the system in the event of a major disruption. The financial impact of such an event could be significant. Estimated losses in net revenue could total \$1.2 million per day should the system become inoperable.

We recommend that Lottery management develop a more robust and comprehensive business continuity framework. The

framework should include specific strategies to address the various levels of emergency that could occur. It should include provisions for ensuring that the plan is regularly updated and tested so that it continues to meet the agency's needs.

We also recommend that management ensure that the necessary system code and documentation reside in escrow as required by the system contract.

Ensuring System Security

Because of the sensitive nature of Lottery's business processes, we have issued a separate report outlining specific details of our work as well as recommendations to improve security. This confidential report was prepared in accordance with ORS 192.501 (23), which allows exemption of such information from public disclosure.

Objectives, Scope and Methodology

The objective of our audit was to evaluate the adequacy of Lottery's

application controls over the Video Lottery System. The audit had the following objectives:

- Determine whether Lottery ensures system data remains complete, accurate, and valid during its input, processing, output, and storage.
- Determine whether Lottery adequately controlled and managed processes for acquiring and maintaining the Video Lottery System.
- Determine whether Lottery ensures the system remains available as required, minimizing the business impact in the event of a major disruption.
- Determine whether Lottery safeguards system information against unauthorized use, disclosure or modification, damage or loss.

We performed our fieldwork between April 2001 and January 2002. Our audit work included inquiries of Lottery personnel, examination of documents related to controls and procedures, and observation of information systems

control processes and operations. We evaluated compliance with applicable laws, rules and regulations pertaining to our audit objectives. We also designed and performed tests to determine if selected controls existed or were working as intended.

During our audit, we used the Information Systems Audit and Control Foundation's (ISACF) publication "Control Objectives for Information and Related Technology" (COBIT) to identify generally accepted and applicable internal control objectives and practices for information systems. ISACF is a worldwide organization dedicated to research, develop, and publicize generally accepted information technology control objectives and audit guidelines.

We conducted our audit according to generally accepted government auditing standards.

Oregon State Lottery's Response



It Does Good Things

September 12, 2002

Cathy Pollino, Director
 Secretary of State, Audits Division
 255 Capitol Street NE, Suite 500
 Salem, OR 97310

RE: Agency Response to Video System Audit - Public Report

Dear Ms. Pollino:

The Oregon Lottery appreciates the efforts of the Audits Division in reviewing the Video Lottery System. The Lottery agrees with the Audits Division's recommendations, but disagrees with other comments and opinions included in the report.

As a general theme, the Audits Division recommends the Lottery improve methodology and documentation, and formalize in greater detail IT operational policies and procedures, including those used to implement procurements from outside vendors. The Lottery agrees with those recommendations. The execution of new systems can be improved by continuing to enhance our methodology and documentation.

The Oregon Lottery will continue to improve and evolve its information system infrastructure as well as its policies and procedures associated with information technology. The policies and procedures in place today are far more comprehensive and detailed than those in place in 1994-98, which is when the new video system was envisioned, developed, tested and implemented. The Oregon Lottery acknowledges that more work can and should be done in these areas. After consideration and discussion, this letter is the Lottery's point-by-point response to the Public report.

"Video Lottery System Application Controls Were Adequate"

The Oregon Lottery agrees that its Video Lottery System Application Controls are "adequate." This system operates 24 hours a day, 7 days a week, 365 days a year, handling over 4.1 million transactions per day on more than 9000 terminals in over 1,850 retail locations

In FY 02, this Video Lottery computer system processed 1.5 billion transactions resulting in \$480.2 million in net revenue (after prizes) and \$263.1 million in net proceeds to the Administrative Services Economic Development Fund. In the last fiscal year, the only statewide downtime was for scheduled maintenance. The video computer system managed and operated by the Oregon Lottery is considered one of the most robust and reliable Video Central Systems in the world. The Oregon Lottery's system application controls are best practice for the Lottery industry and result in system performance that is at par with the financial industry.

"Processes for Acquiring IT solutions and Managing Contract Services Needed Improvement"

The Oregon Lottery agrees that its documentation of the policies and procedures used to guide personnel when acquiring and implementing a system from an outside vendor could be consolidated, more detailed and granular in nature. In 1995, the Lottery's goal was to replace its aging video system, whose lease was expiring, with a more advanced system that exceeded the requirements and capacity of the older system. At that time, the Lottery relied primarily on the Request For Proposal (RFP) document and the deliverables it contained to acquire the new video system. Today, the Lottery relies upon multiple documents for the acquisition of information technology with the complexity of the Video System. Policies and procedures for acquiring IT systems and for managing projects classified as major procurements are covered in the Lottery's administrative rules (OAR 177-0035), Materials Management's Internal Operating Procedures, project management standards developed by the *Project Management Institute*, the specific RFPs and the Contract itself.

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System Testing and Acceptance

The Oregon Lottery disagrees with Audits Division's opinion that Lottery accepted the video system before it was thoroughly tested. The Lottery conducted exhaustive testing prior to accepting the system. Staff conducted tests for eight months and uncovered over 9,800 issues that were corrected by the contractor prior to conversion of even the first retailer. The complexity and logistics of converting this type of system in a live environment always results in the discovery of bugs and issues once the system is moved into production and fully loaded with transactions. For that reason, and by mutual agreement, GTECH converted all retailers to the new system prior to acceptance, which far exceeded the terms of the contract (system acceptance depended on getting 50 retailers operating correctly on the new system).

The audit asserts the Lottery paid for modifications of the system that should have been identified prior to acceptance. Lottery remains in disagreement with Audits Division on this opinion. The Lottery consulted with the AG specifically to ensure that the \$107,000 and \$55,000 expenditures mentioned in the report were enhancements based on new requirements specified by the Lottery, and not deliverables under the original contract. Therefore, the Lottery is confident that it did not overpay for work that should have been delivered under the terms of the original contract.

Contract Administration

Although the Lottery agrees that its system development life cycle methodology could be improved, the Lottery is confident that the negotiation and signing of the Video contract in 1995 met all of its procedural requirements and followed all of the required approval steps, including AG review. The Video contract articulated provisions for support and warranty, which were understood and adhered to by both parties. To date, GTECH has not charged the Lottery to fix what Lottery deemed to be deficiencies uncovered in the system. Also, during the time of system conversion, the Lottery received hundreds of hours of support that went far beyond the four corners of the contract. Subsequent amendments to the contract have established how we currently receive support for the system. The Lottery is unaware of any instances where "Lottery may have limited its options for resolving contract issues." If disputes occur over contract requirements, terms, or conditions, the contract specifies that the ultimate decision-making authority reside with the Lottery director. Furthermore, even if Lottery agreed that the \$107,000 and \$55,000 expenditures were deliverables under the original contract, GTECH reimbursed the Lottery approximately \$1.3 million above and beyond the \$107,000 and \$55,000 expenditures to keep the State whole for any issues that occurred during the conversion to the new system.

The Oregon Lottery disagrees that it paid for services it did not receive. When the Lottery prepared the Request for Proposal (RFP) for the video central system in 1994, "progressive" and "downloadable functionality" were on the industry's horizon, which is why the Lottery included them as a service capability in the RFP. GTECH delivered a system capable of accommodating both progressives and downloadable functions. However, at the time of implementation the downloadable and progressive functionality had not been refined within the lottery industry. At the time, the Lottery decided (in Addendum 2 to contract) to defer the implementation and allow the industry to mature these offerings rather than pioneer these efforts itself. To date, the Lottery has decided to defer the activation of progressives as a game feature as a matter of public policy. Nonetheless, GTECH has demonstrated the ability to provide progressive and downloadable functionality. This is evidenced by Rhode Island's implementation of GTECH's progressive function, and when/if the Lottery chooses to activate the progressive game feature, GTECH will implement progressives without additional cost. In regards to the downloadable feature, Lottery continues to defer implementation to the Video Lottery Terminals. However, GTECH remains committed to providing this functionality and is prepared to implement it once Lottery is ready. The Video system is currently providing download functions between the video central computer system and all remote Video Management Terminals.

The Audits Division's comments that "Lottery had not received Lottery Commission approval to implement games requiring the functions." We respectfully disagree. The Lottery Commission was fully aware of and did endorse the Lottery's plans to include progressive and downloadable functions in its Video central system. This is documented through the Lottery Commission's formal approval of the contracts that authorized progressive and downloadable functions.

To provide further clarity on this issue, Commission approval is not necessary to implement downloadable functions, which basically provide technical infrastructure between the central system and the VLTs. These activities were documented business initiatives in Lottery's Commission-approved 1999-2002 Business Plans. The Commission has approved video lottery games, such as video poker, where progressives could be included as an additional game feature. The only rulemaking that would be necessary by the Commission to implement progressives would be to provide the public with information about how the new progressive prize pool is structured, how a progressive prize is won, etc.

The Oregon Lottery disagrees with the auditors' opinion that the \$102,000 incentive was not a prudent expense. The Lottery included an early completion incentive for the contractor because the Commission-approved Business Plan for FY 01 directed the Lottery to be prepared for these new Video Lottery games that year. More importantly, GTECH had formally informed the Lottery that the Boca Dreamport facility would be closing in April/May of 2001. GTECH anticipated losing personnel, which would have caused a subsequent time lag in GTECH's ability to deliver this requested modification. As a result of Commission direction and discussions with the Governor and DAS Director about when Lottery could activate "line games," the Lottery Director made a calculated business decision to provide an incentive to accelerate the modification process and meet the estimated timelines. To provide "line game" capabilities and other games that required more complex technology, the Lottery chose to upgrade the system to accommodate multi-packet data transmission instead of the single packet originally envisioned. It is also important to note that the Oregon Lottery held GTECH to a very high acceptance threshold and included an equally unattractive penalty clause that would have penalized GTECH up to \$102,000 for missing the delivery due date. The modification was completed ahead of schedule and installed without any problems.

The Oregon Lottery did not complete a "formal" cost-benefit analysis on the multi-packet upgrade because of its obvious need and because it was clear from our estimates that these new types of games would make the State millions of additional net proceeds per year (e.g.: games residing on chips but not yet activated are estimated to produce approximately \$100 million more in net proceeds per biennium). From the Lottery's perspective at the time, the incentive concept was innovative and worthwhile. Given the future potential revenue from new games, the Lottery did not believe the expenditure of \$442,000 for this amount of software development warranted further analysis or documentation.

Recommendation: Develop and adopt a more comprehensive "SDLC" methodology to specifically address the control risks associated with outsourcing or acquiring computer systems:

Lottery Response

The Lottery agrees. Lottery's Chief Information Officer and Information System Security Consultant will be responsible for preparing an action plan to develop and adopt a more comprehensive system development life cycle methodology to address and resolve the audit issues. The methodology will include specific policies and procedures to ensure that all phases of system development, acquisition, and maintenance are adequately controlled. Development of the action plan will be completed by January 31, 2003, and will include timelines for completing tasks and assignments of responsibility.

Recommendation: Manage IT contracts according to best business practices to ensure service agreements and warranties are clearly defined and formal analysis and documentation of costs, benefits and alternatives are performed.

Lottery Response:

Lottery agrees and will continue to apply its learning, just as its practices and documentation have continued to evolve since 1995. The Lottery continues to learn from and model itself after successful private sector businesses and effectively applies project management tools and techniques. During Fiscal Years 97-99, the Lottery successfully implemented two major central systems (Video and Online) and a new Frame Relay communications network without compromising revenues or profits. In fact, we generated combined sales of \$2.2 billion and net profits of \$905.2 million during that time frame that set a new record. The Lottery's current control systems have not failed us and have enabled us to implement these major systems and others, according to plan, without crisis or critical failure.

The Oregon Lottery has successfully managed central system computer contracts for the past 17 years. During those 17 years, the Lottery has generated over \$3 billion in profits while successfully migrating between two different GTECH Online computer systems and two different vendors' Video computer systems.

"IT Continuity Plans were Insufficient"

Disruption to the revenue stream is always a possibility, which is why the Oregon Lottery operates a duplex system with an additional system available at the Burns warm site. We perform regular backups of both system programs and data with a scheduled rotation both on-site and off-site. With or without a consolidated business continuation plan, the Lottery has the communication network and computer infrastructure in place to start generating revenue in approximately 80% of its Video Lottery retail locations within 7 days of a catastrophic event at the Lottery headquarters facility. The Oregon Lottery also has established and implemented escrow storage of system programs and documentation. This was an ongoing effort during the time of this audit.

Recommendation: Develop a robust and comprehensive business continuity framework.

Lottery Response:

We agree. This is an agency wide project for the current fiscal year. Phase 1 of the project will be completed by the end of the calendar year 2002, and will include the consolidation of our Business Recovery Plan, the Disaster Recovery Plan developed by GTECH, and the Y2K Business Continuation Plan into a single document. Phase 2 of the project will include a Gap Analysis to determine what is missing from the combined plan, and make appropriate recommendations. The framework will include specific strategies to address the various levels of emergency that could occur. It also will include provisions for ensuring that the plan is regularly updated and tested so it continues to meet agency's needs.

Recommendation: Ensure that necessary system code and documentation reside in escrow.

Lottery Response:

We agree, and this work has been completed. The necessary system code and documentation currently resides in escrow.

Sincerely,



Chris Lyons, Director

This report, which is a public record, is intended to promote the best possible management of public resources. Copies may be obtained by mail at Oregon Audits Division, Public Service Building, Salem, Oregon 97310, by phone at 503-986-2255 and 800-336-8218 (hotline), or internet at Audits.Hotline@state.or.us and <http://www.sos.state.or.us/audits/audithp.htm>

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The courtesies and cooperation extended by the officials and staff of the Oregon State Lottery Commission were commendable and much appreciated.

Auditing to Protect the Public Interest and Improve Oregon Government
