

Acceptance Test Plan/Test Script Creation/Acceptance Test Execution – Draft Template

Best Practice for Quality Assurance of Product Development in the Lottery Industry: Acceptance Testing

Version 1.0, October 2007

NASPL

THE *Open* GROUP
Making standards work™

Copyright © 2007, The Open Group

All rights reserved.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior permission of the copyright owner.

The Open Group® is a registered trademark of The Open Group in the United States and other countries.

Acceptance Test Plan/Test Script Creation/Acceptance Test Execution – Draft Template

**Best Practice for Quality Assurance of Product Development in the Lottery Industry:
Acceptance Testing**

Version 1.0, October 2007

Published by The Open Group, October 2007

Comments relating to the material contained in this document may be submitted to:

nsi-specifications@opengroup.org

Contents

1	Introduction	1
1.1	General Requirements	1
1.2	Authored by the Lottery	1
1.3	Change History	1
1.4	Acceptance Test Plan Approval	2
2	Supporting Information	3
2.1	Project Summary	3
2.2	Additional Resources	3
2.2.1	Acceptance Testing: Test Script Creation	3
2.2.2	Acceptance Testing: Acceptance Test Execution	3
2.3	Roles and Responsibilities	3
3	Acceptance Test Plan	4
3.1	Risk Assessment	4
3.2	Test Environment	4
3.2.1	Installation and Integration	5
3.3	Training Requirements	5
3.4	Financial and Activity Balancing	5
3.5	Testing Schedule and Approach	5
3.6	Testing Types	5
3.7	Test Reporting	5
3.8	Criteria	6
3.8.1	Entry Criteria	6
3.8.2	Suspension and Resumption Criteria	6
3.8.3	Acceptance Criteria	6
3.9	Hardware Requirements	6
3.10	Test Site Requirements	6
3.11	Updating the Acceptance Plan	6
4	Acceptance Test Plan: Gaming Systems	7
4.1	Installation and Integration	7
4.2	Test Strategies	7
4.3	Test Documentation	7
5	Test Script Creation	9
6	Acceptance Test Execution	10
6.1	Plan Execution	10
6.2	Defined Tests	10
6.3	Identified Problems	10

6.4	Formal Acceptance – Test Results.....	10
6.5	Course of Action.....	10
A	Approval Signature Page – Test Plan.....	11
B	Approval Signature Page – Test Results.....	12
C	Terms, Definitions, Acronyms.....	13
D	System Testing –Test Strategies	14
D.1	Anomaly Testing.....	14
D.2	Business Cycle Testing.....	14
D.3	Configuration Testing.....	14
D.4	Conversion Testing.....	14
D.5	Failover and Recovery Testing.....	15
D.6	Functional Testing.....	15
D.7	Installation Testing.....	15
D.8	Interoperability Testing.....	16
D.9	Operations Testing.....	16
D.10	Performance Testing.....	16
D.11	Regression Testing.....	17
D.12	Security and Access Control Testing.....	17
D.13	Usability Testing.....	18
D.14	Volume Testing.....	18

1 Introduction

This template contains all the best practice requirements contained in the Best Practice for Quality Assurance of Product Development in the Lottery Industry: Acceptance Testing: Acceptance Test Plan/Test Script Creation/Acceptance Test Execution.

1.1 General Requirements

This document is the high-level document that will be referenced by both the lottery and the vendor. The lottery must author the Acceptance Test Plan which includes all planned testing to be performed for acceptance. The lottery must review the Acceptance Test Plan with the vendor and the vendor should review the Acceptance Test Plan with respect to any dependencies on the vendor.

This Acceptance Test Plan will be implemented and maintained in compliance with the NSI Best Practice for Quality Assurance of Product Development in the Lottery Industry: Acceptance Testing (Doc. No. BP0403).

1.2 Authored by the Lottery

The Acceptance Test Plan must be authored by the lottery or an authorized lottery representative.

This section includes the date of creation and the author(s) responsible for the creation of the Acceptance Test Plan.

Date	Author(s)

1.3 Change History

This section records changes to the Acceptance Test Plan – the version number, the date of update/change, the author responsible, and a brief description of the context of the revision to the Acceptance Test Plan.

Once the Acceptance Test Plan has been reviewed, it may be modified if the changes are mutually agreed by both the lottery and the vendor.

Lottery Review

Version	Date	Reviewed by/Title/Role

Vendor Review

Version	Date	Reviewed by/Title/Role

1.4 Acceptance Test Plan Approval

The Acceptance Test Plan must be formally reviewed and receive a sign-off from both the lottery and the vendor.

The vendor should especially review the Acceptance Test Plan with respect to any dependencies on the vendor; see Appendix A.

2 Supporting Information

2.1 Project Summary

This section lists the details for the project associated with this Acceptance Test Plan.

Project Name:	
Project Description:	
Project Start Date:	

2.2 Additional Resources

2.2.1 Acceptance Testing: Test Script Creation

This template (see Chapter 5) contains all the best practice requirements contained in the Best Practice for Quality Assurance of Product Development in the Lottery Industry: Acceptance Testing: Test Script Creation.

2.2.2 Acceptance Testing: Acceptance Test Execution

This template (see Chapter 6) contains all the best practice requirements contained in the Best Practice for Quality Assurance of Product Development in the Lottery Industry: Acceptance Testing: Acceptance Test Execution.

2.3 Roles and Responsibilities

The primary constituent is the lottery. The vendor plays a secondary role.

This section lists each role, the description of the role, and the person responsible for fulfilling the duties of that role.

Name	Role	Description

3 Acceptance Test Plan

Acceptance Testing is the process by which the lottery verifies that the delivered lottery system or system components meet all of the contractual requirements, meet the lottery's standards for quality, and are thus acceptable for deployment into the lottery environment.

All planned testing to be performed for acceptance must be documented in the Acceptance Test Plan. The Acceptance Test Plan must cover the areas documented in the Requirement Checklist, and if the lottery believes that an area is not applicable for the product being tested, the Acceptance Test Plan must state the reason explicitly along with supporting documentation.

Best practice in Acceptance Testing involves the use of a defined testing process that spans test planning, test specification, test execution, and test reporting. Good Acceptance Testing will clearly identify the roles and responsibilities of the lottery and the vendor, be based on standard Acceptance Testing procedures, and use an agreed approval process with defined acceptance criteria.

3.1 Risk Assessment

The impact of the new product on the lottery must be included in the Acceptance Test Plan. Each of the following areas must be considered:

- Lottery systems as a whole
- Systems components
- Business processes
- Features not to be tested

Type	Impact	Assessment	Minimize by:
Lottery systems as a whole			
Systems Components			
Business processes			
Features not to be tested			

3.2 Test Environment

This section describes what is required to conduct Acceptance Testing. The Acceptance Test Environment will be reviewed during the Acceptance Test Readiness Review which is part of the requirements in the Best Practice Quality Assurance of Product Development in the Lottery Industry: Development Process.

3.2.1 Installation and Integration

This section includes the procedures for installation and integration of the system components into the Acceptance Test Environment.

3.3 Training Requirements

This section includes any training required for the Acceptance Testing.

3.4 Financial and Activity Balancing

This section describes the processes and requirements for the financial and activity balancing.

3.5 Testing Schedule and Approach

Milestones for the development and approval of the test scripts must be included in the schedule.

Start Date	End Date	Milestone
		Development of test scripts
		Approval of the test scripts

3.6 Testing Types

Appendix D defines the various test strategies that may be employed during Acceptance Testing.

If the lottery chooses to rely on the vendor's internal testing rather than perform the testing itself, then during Acceptance Test Execution, the lottery's testers must validate that the testing was performed and must validate that satisfactory results were achieved.

The test designers should consider all of the test strategies and must determine the specific set of testing to be performed for acceptance based on the particular system or system component to be tested.

3.7 Test Reporting

All test reports must include both actual and expected results and must highlight any deviations from the expected results.

Description	Expected Result	Actual Result	Deviation

3.8 Criteria

This section contains the criteria that must be met in order to start or stop Acceptance Testing.

3.8.1 Entry Criteria

This section must include entry criteria to be met in order for the lottery to commence Acceptance Testing. The entry criteria must include a criterion indicating that the Acceptance Test Readiness Review has been completed and that the lottery representative has authorized commencement of Acceptance Testing based on this review.

3.8.2 Suspension and Resumption Criteria

This section must contain suspension and resumption criteria. These criteria must define the conditions under which some or all of the testing identified in the Acceptance Test Plan must be halted, and the conditions that must be met in order to resume testing activity after a suspension.

3.8.3 Acceptance Criteria

This section must include the acceptance criteria that must be met in order for the lottery to accept the lottery system or system components.

3.9 Hardware Requirements

This section must include a list of all hardware that will be used during the Acceptance Testing. Examples of what could be included are: number of terminals, communications network equipment, and connectivity to various systems.

3.10 Test Site Requirements

This section must include the requirements and working conditions needed at the test site, which may include: test system set-up, number of testing terminals.

3.11 Updating the Acceptance Plan

This section must include detailed plans for the updating of the Acceptance Test Plan.

4 Acceptance Test Plan: Gaming Systems

In addition to meeting the Best Practice Requirements for the Acceptance Test Plan, any Acceptance Test Plan that includes testing of a gaming system should also meet the following requirements for the Acceptance Test Plan for Gaming Systems. In some cases, the requirements here are an expansion of the general Acceptance Test Plan requirements.

4.1 Installation and Integration

In addition to the Best Practice requirements for the Acceptance Test Plan, this section should include a description of any pre-requisites for installation.

In some cases, specific actions need to be taken prior to installation of gaming system components to enable specific testing to be performed; for example, wagers, validations, or reports may need to be created prior to the installation of gaming system components.

In other cases, installation may need to occur as part of a specific test, and this should be defined in the preconditions for the test.

4.2 Test Strategies

In addition to the Best Practice requirements for the Acceptance Test Plan, this section should include test strategies for:

- Testing designed to mimic everyday production, in order to determine how well the product interacts with other games and applications during normal business use
- Testing of non-typical conditions
- Non-typical conditions, which may include: user-requested reports, testing of periodic activities that do not occur everyday, such as end-of-month processing

4.3 Test Documentation

In addition to the Best Practice requirements for the Acceptance Test Plan, this section should include the following, which should apply when writing the detailed test documentation for each type of testing to be performed.

The description of what capabilities are being tested should include explicit information on how the gaming system will interact with one or more of the following:

- Other games
- Applications

- End-user GUIs

The test preconditions should explicitly describe the required condition of the system prior to the start of testing. If installation of a gaming system component is to be performed as part of the test rather than prior to it, the test preconditions should describe the actions required prior to installation, which should include:

- Establishing a known condition of the system
- A description of at what point installation occurs

For example, to test validation of a multi-draw ticket part-way through the draws, the preconditions may include:

- Creation of the multi-draw ticket
- Performing at least one draw, prior to installing the new gaming system component
- Ensuring that the system reflects the draw history prior to executing the test instructions

The specific test instructions should provide testing to cover enough business days to completely test the drawings, validations, purging, and billing cycles for the accounting periods.

5 Test Script Creation

Each test script must include:

- A description of what capabilities are being tested
- Test preconditions – the set-up and configuration required to facilitate a known state of the system prior to executing an individual test or group of tests
- Specific test instructions
- Expected test results

Each test script should include:

- Test post-conditions – the operations that should be performed to restore the system to a neutral state after the running of an individual test or group of tests; this is also known as test clean-up

6 Acceptance Test Execution

6.1 Plan Execution

Acceptance Testing must be executed in accordance with the process defined in the Acceptance Test Plan.

6.2 Defined Tests

All types of testing defined in the Acceptance Test Plan must be completed and test reporting must be completed in accordance with the procedures defined in the plan.

6.3 Identified Problems

All problems identified as a result of the new product must be reported to the vendor using the agreed problem reporting mechanism.

Problem Description	Reported to the Vendor (Date)

6.4 Formal Acceptance – Test Results

At the completion of Acceptance Testing, the lottery Quality Management must sign-off on the testing to formally accept the system components as meeting the contracted requirements; see Appendix B.

6.5 Course of Action

If Acceptance Testing indicates that the vendor's product does not meet the acceptance criteria, then the vendor and lottery must work together to determine a suitable course of action, which must result in one of the following:

- Revised deliverables
- Revised acceptance criteria
- Other defined actions

A Approval Signature Page – Test Plan

This appendix contains the Acceptance Test Plan Approval sheet.

Signatures indicate that the Acceptance Test Plan associated with the project below has been formally reviewed and signed-off by both the lottery and the vendor.

Project Name:	
Project Description:	
Project Start Date:	

Lottery Approvals

Approved by	Role	Signature	Date

Vendor Approvals

Approved by	Role	Signature	Date

B Approval Signature Page – Test Results

This appendix contains the formal approval of the Acceptance Testing results.

Signatures indicate that the Acceptance Testing results for the project listed below have been formally reviewed and signed-off by the lottery Quality Management.

Project Name:	
Project Description:	
Project Start Date:	

Lottery Approvals

Approved by	Role	Signature	Date

C Terms, Definitions, Acronyms

This appendix defines the terms and acronyms used in the Acceptance Test Plan.

D System Testing –Test Strategies

This appendix defines the various types of testing that may be deployed during the testing of lottery systems. System testing is usually performed during a vendor's internal test process and during the lottery's Acceptance Testing.

The test methods defined below are applicable for use in testing a complete lottery system. The descriptions provide information on what the test method is, the purpose of that particular type of testing, and techniques for how the testing is performed.

D.1 Anomaly Testing

Anomaly testing is used to determine how the system reacts to anticipated user errors such as invalid input. This testing will help validate that error messages are useful and accurate.

D.2 Business Cycle Testing

Business cycle testing is used to verify the operation of the system over time. This testing emulates the activities performed on the system over all applicable business cycles, including daily, weekly, and monthly cycles, and any events that are date-sensitive.

This testing is performed by identifying a time period, such as an invoice period, and executing all transactions and activities that would occur during that period.

D.3 Configuration Testing

Configuration testing verifies the operation of the system on multiple platform configurations. This type of testing is intended to uncover compatibility issues between different software and hardware configurations. In most production environments, the particular hardware specifications for the client workstations, network connections, and database servers vary. Client workstations may have different software loaded – for example, applications or drivers – and at any one time, many different combinations may be active using different resources.

D.4 Conversion Testing

Conversion testing is used to verify that data is handled consistently when converting from one system to another (i.e., converting to a new gaming system). This is accomplished by running data through both systems in parallel and validating that the systems show the same results.

D.5 Failover and Recovery Testing

Failover and recovery testing verify that the system can successfully failover and recover from a variety of hardware, software, or network malfunctions with undue loss of data or data integrity.

Failover testing ensures that, for those systems that need to be kept running, when a failover condition occurs, the alternate or backup systems properly “take over” for the failed system without loss of data or transactions.

Recovery testing is an antagonistic test process in which the system is exposed to extreme conditions, or simulated conditions, to cause a failure, such as device input/output (I/O) failures or invalid database pointers and keys. Recovery processes are invoked and the system is monitored and inspected to verify that proper system and data recovery has been achieved. Recovery testing needs to cover both the automated aspects of system recovery as well as the manual procedures required.

D.6 Functional Testing

Functional testing is testing of a system against its base requirements. This type of testing is based upon black box techniques in which the tester knows the inputs and expected outcomes of the system, but not how the program arrives at those outputs.

The purpose of functional testing is to verify that the system performs in accordance with the specified business and technical requirements. The goal of functional testing is to verify system functions such as proper data acceptance, processing, and retrieval, and the appropriate implementation of the business rules.

Functional testing verifies the system or component and its internal processes by interacting with the system via the user interface and analyzing the output or results. Functional testing is used to verify that the system performs correctly when subjected to a variety of circumstances and repetition of the transactions.

One of the specific aspects of functional testing important to the testing of lottery systems is included below.

Audit Trail Testing

Audit trail testing is testing of the audit trail function to ensure that a source transaction can be traced to a control total, that the transaction supporting a control total can be identified, and that the processing of a single transaction or the entire system can be reconstructed using audit trail information.

D.7 Installation Testing

There are two types of installation testing.

The first is typically used by vendors when preparing a system for release to a customer. The purpose of this testing is to ensure that the system can be installed under different conditions

such as a new installation, an upgrade, and a complete or custom installation under normal and abnormal conditions. Abnormal conditions include insufficient disk space, lack of privilege to create directories, and so on.

The second type of installation testing, which may be performed during either the Development Process or Acceptance Testing, verifies that, once installed, the system operates correctly. This usually means running a number of the tests that were developed for functional testing.

D.8 Interoperability Testing

Interoperability testing is a formalized testing process where people, procedures, and systems/equipment are brought together in an operational environment to test the system interfaces and determine the reliability, usability, timeliness, and accuracy of the exchanged information.

In the lottery environment, interoperability testing is primarily testing that a lottery system interacts with other systems, such as a credit card authorization system, an ICS, or another back-office system. Testing is performed at the system boundaries to make sure that the two systems interface correctly.

D.9 Operations Testing

Operations testing is the testing of a complete system's operational characteristics and processes including start-up, operation, and recovery.

Operations testing verifies that the system can be operated and supported by the operations staff in an efficient and consistent manner. Testing is usually performed following documented operational procedures and checklists. Operations testing is performed on the production system, or a system that mimics the production system.

D.10 Performance Testing

Performance testing is designed to establish the performance of a system against predefined metrics or other alternative systems. Performance testing will test aspects of a system's performance such as response times, transaction rates, availability, capacity, and scalability. Typical performance testing measures include throughput, response time, storage capacity, and concurrent use. There are multiple types of performance-related tests; each is described below.

Performance Profiling

Performance profiling is a performance test in which response times, transaction rates, and other time-sensitive requirements are measured and evaluated. The goal of performance profiling is to verify that performance requirements have been achieved. Performance profiling is implemented and executed to profile and tune a system's performance behaviors as a function of conditions such as workload or hardware configurations.

Load Testing

Load testing is a performance test which subjects the system to varying workloads to measure and evaluate the performance behaviors and ability of the system to continue to function properly under these different workloads. The goal of load testing is to determine and ensure that the system functions properly beyond the expected maximum workload. Additionally, load testing evaluates the performance characteristics such as response times, transaction rates, and other time-sensitive issues.

Stress Testing

Stress testing is a type of performance test implemented and executed to find errors due to low resources or competition for resources. Low memory or disk space may reveal defects in the system which are not apparent under normal conditions. Other defects might result from competition for shared resources like database locks or network bandwidth. Stress testing can also be used to identify the peak workload the system can handle.

Stress testing is very important given the potential for extreme spikes in system use during high jackpot periods and other events that place unexpected loads on the system. Stress testing should occur at various times throughout the internal test cycles and, if required, during the acceptance test cycle. Stress testing should emulate various scenarios and operating conditions to ensure that the system will degrade gracefully. In addition to exercising normal usage patterns (i.e., wagers, validations, cancellations), stress testing should also exercise any system mechanisms to provide point-of-sale updates as these can place extreme load on the communication mechanism.

D.11 Regression Testing

Regression testing is the selective re-testing of a system or component that has been modified to verify that the modifications have not caused unintended effects and that the system or component still complies with its specified requirements.

In the context of a particular system component, regression testing is used to ensure that modifications to the system component to fix defects or add functionality have not introduced problems in unmodified and previously working functions of the component.

In the context of a lottery system, regression testing is used to ensure that the system component being installed does not affect any portion of the lottery system already installed or any system components that interface with the new component.

Regression testing is typically performed using previous error-free tests to provide the assurance that the defects reported to be fixed are indeed fixed and that the system or component has not introduced unintended effects in the unaltered parts of the system. It is considered best practice to automate regression testing wherever possible.

D.12 Security and Access Control Testing

Security and access control testing is performed to ensure that established security rules, procedures, or regulations are properly handled by the system.

Security and access control testing focus on two key areas of security:

- Application-level security, including access to the data or business functions
- System-level security, including logging into or remote access to the system

Application-level security ensures that, based upon the desired security, actors are restricted to specific functions or use-cases, or are limited in the data that is available to them. For example, everyone may be permitted to enter data and create new accounts, but only managers can delete them. If there is security at the data level, testing ensures that “user one” can see all customer information, including financial data; however, “user two” only sees the demographic data for the same client.

System-level security ensures that only those users granted access to the system are capable of accessing the applications and only through the appropriate gateways.

Virus protection and intrusion detection ensure that systems are not susceptible to unwanted access and control. The system should be tested to ensure that intrusions and viruses are not facilitated; for example, by leaving open ports.

D.13 Usability Testing

The ultimate success of the system will depend heavily on the ability of people to use it. Testing the ease-of-use of the system by people is an important aspect of testing. As usability is difficult to evaluate prior to the test phases, it is important that the people aspect of the system is evaluated in as realistic an environment as possible. One aspect of usability testing is manual testing of typical usage scenarios to ensure that the people interacting with the automated system can perform their functions correctly.

Testing for “user- friendliness” is clearly subjective and will depend on the targeted end user or customer. User interviews, surveys, video recordings of user sessions, and other techniques may be used. Quality assurance testers are usually not appropriate usability testers. Quality assurance typically measures the degree to which the system can be understood, learned, used, and liked by the user when the system is used under specified conditions. Quality assurance tests the ease-of-navigation, layout and design, performance, error feedback, and consistency of the system to determine the system 's overall usability.

If a User Guide accompanies the system, it is reviewed to verify that all instructions are correct and that all figures and images displayed in the User Guide match the screens displayed in the system. As many users rely on the User Guide that accompanies a system, it is critical to ensure that it is correct.

D.14 Volume Testing

Volume testing subjects the system to large amounts of data to determine whether limits are reached that cause the software to fail. Volume testing also identifies the continuous maximum load or volume the system can handle for a given period.