

I-MANAGE PROGRAM

I-MANAGE SQA PLAN

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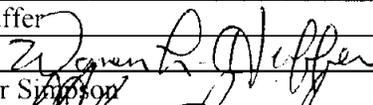
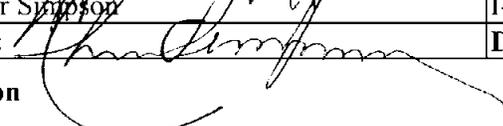
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Acronyms and Abbreviations

CMP	Configuration Management Plan
CAR	Corrective Action Record
COTS	Commercial Off The Shelf
CMM	Capability Maturity Model
DCT	Design, Configure, Test
DCTT	Design, Configure, Test Team
DOE	Department Of Energy
FDW	Financial Data Warehouse
GOTS	Government Off The Shelf
IDW	I-MANAGE Data Warehouse
I-MANAGE	Integrated Management and Navigation System
PMA	President's Management Agenda
POAM	Plan Of Action, with Milestones
PR	Problem Report
QA	Quality Assurance
SBS	Standard Budget System
SDP	Software Development Plan
SDM	Software Development Manager
SME	Subject Matter Experts
SMP	Software Management Plan
SQA	Software Quality Assurance
SQAP	Software Quality Assurance Plan
STA	Software Testing Audits

1. Introduction

1.1 Purpose

The purpose of this Software Quality Assurance Plan (SQAP) is to define the techniques, procedures, and methodologies that will be used by the I-MANAGE Program for each project within the program. The format for this document follows that described by the Department of Energy, Chief Information Officer's Software Quality Assurance website: http://cio.doe.gov/ITReform/sqse/quality_assurance.htm.

This is a *Living* Document and may be changed at the request and with agreement of the Project Managers of the I-MANAGE Program and approval of the I-MANAGE Program Manager.

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1.2 Scope

I-MANAGE SQA will vary from project to project because I-MANAGE is a collection of projects in various stages of development and completion and with varied contractual arrangements, life-cycles and execution strategies. Projects may (at least potentially) range from strict COTS applications with zero modifications to ones in which the software is developed from scratch. Though the activities and frequency of SQA activities will be different from project to project, the approach to conducting the activities will be similar and should provide solidly auditable conclusions.

Since the majority of I-MANAGE projects involve systems that are COTS packages, testing and SQA activities should not be tailored to software development in the traditional sense of testing software built from the ground up. Instead, testing and SQA activities should be tailored to determine the confidence that the COTS packages, with adjustments, meet the requirements of each project. In areas where the adjustments made to the COTS packages are more numerous, such as data conversions, testing and SQA activities will be more robust.

The use of this plan will help assure that: (1) software development, evaluation and acceptance standards are developed, documented and followed; (2) test results adhere to acceptance standards; (3) the results of software quality reviews and audits will be given appropriate management consideration within I-MANAGE; and (4) sufficient and proper Quality Assurance processes are in place, being followed, and properly documented. This document will be used as a guide to the type and frequency of assessments and reviews to be conducted to certify the quality of the I-MANAGE systems.

I-MANAGE SQA is team effort that is multi-layered. (1) First, the prime contractor designing the systems and modules conducts SQA activities in their design and development at a CMM Level 3 or higher to ensure the quality of their work. (2) Next, I-MANAGE federal and contractor personnel work together to conduct SQA activities such as internal reviews of themselves, looking for errors and cross-checking to ensure that the work performed is correct and meets the requirements. (3) Third, I-MANAGE federal and contractor personnel work with the SQA Team to conduct SQA activities on testing and processes to ensure that they are being conducted in accordance with prescribed plans, policies, guidelines and instructions. (4) Finally, an outside and unbiased source is used to validate all I-MANAGE SQA activities and provide a clear indication of the confidence of the testing and processes quality.

IMPORTANT NOTE: It is important to note that the validation of any quality assurance program requires an independent certification of the activities being validated, meaning there must be an independent outside "look" for management control purposes.

1.3 Background

The Department launched the Integrated Management Navigation System, I-MANAGE, in January 2003, as a cost-saving program designed to use technology to meet the challenge for achieving greater management efficiencies. The I-MANAGE Program is a key cornerstone in the Department's efforts to implement improved financial performance, integrated budget and performance, and expanded electronic government, as outlined in the President's Management Agenda. I-MANAGE is a portfolio of projects contributing to the Department's Enterprise Architecture.

The Standard Accounting and Reporting System (STARS) will provide the Department with a modern, comprehensive, and responsive financial management system that will be the

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foundation for linking budget formulation, budget execution, financial accounting, financial reporting, cost accounting, and performance measurement. The I-MANAGE Data Warehouse (IDW) will contain critical information from multiple functional areas such as human resources, payroll, procurement, and financial management to illustrate just a few examples. This data will be aggregated and summarized to provide mission critical reporting and query capability.

The Standard Budget System (SBS) will create unified budget formulation, execution, and accounting processes that are all linked through the I-MANAGE Data Warehouse. Other follow-on projects will be supported by IDW data and linked to the systems as necessary. Planned follow on projects include eTravel, eProcurement, and Information Document Management System (IDMS); all of which are being designed to improve the efficiency of the Department.

Projects that are in the mature stages of their life-cycles have been included in the I-MANAGE portfolio and other projects will be added in the future. For instance CHRIS (Corporate Human Resources Information System) is now part of I-MANAGE. The CHRIS project has numerous planned improvements, changes and modifications that will require software testing and SQA activities that take into consideration that the software is in the maintenance and improvements stages of its life-cycle.

1.4 References

1. I-MANAGE Test Plan
2. DOE's Software Engineering Methodology (SEM)
3. I-MANAGE STARS Cross-Accountability Matrix
4. I-MANAGE IDW Cross-Accountability Matrix
5. DOE Business Systems Configuration Management Plan, October 2003
6. McCabe, Thomas J. & Butler, Charles W. "Design Complexity Measurement and Testing." December 1989
7. SEI Inc. Capability Maturity Model (CMM), www2.umassd.edu/SWPI/processframework

1.5 Types of Code

Three basic types of code are written to provide functionality to I-MANAGE. They are: (1) Reports; (2) Conversions; and (3) Interfaces. Each type of code has its own characteristics that dictate the type and level of testing and quality assurance activities that must be conducted to ensure the processes and testing are adequate to provide a system that: (1) is technically and functionally correct; (2) is numerically correct; and (3) has adequate platform stability.

For instance, SQA activities should ensure that the I-MANAGE processes are producing reports that are adequate (meet the approved specifications and project/program standards), with the knowledge that the process can be improved or problems with the processes corrected in the future. Conversely, SQA activities associated with conversion code production processes should ensure that the conversions are 100% accurate each time a conversion is accomplished. Conversion software is that which is used to populate the new systems with Legacy System data. This is accomplished by conducting a greater number of QA activities (audits for example), of greater detail and with immediate attention to problems requiring correction. The level of accuracy demanded in the conversion production processes is greater than that for producing reports. It must be kept in mind, though, that conversion software is for a single use in converting data. Once a conversion is completed, the software will probably not be used again, thus the Quality Control level of effort would be minimal compared to Reports and Interfaces.

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Interface software will be used repeatedly and into the future so different factors in SQA activities and testing will come to bear. For example, interface SQA and testing activities must ensure a high level of integrity of the software over time and from version to version where as this is not a concern for the conversion software process.

2. SQA Staffing

2.1 SQA Roles and Responsibilities

The Contractor Project Team consists primarily or solely of contractor personnel developing the individual project that perform SQA activities. The Project Team consists of contractor and federal personnel that perform regular, internal SQA activities. The I-MANAGE SQA Team consists of I-MANAGE program personnel, contractor and federal project personnel that conduct SQA activities in a more formal manner, but still internally to the I-MANAGE Program. The outside assessor is personnel that conduct independent I-MANAGE program and project assessments.

The SQA Manager is responsible for organization and the conduct of all SQA activities. The SQA Manager shall ensure that a reasonable schedule for conducting I-MANAGE SQA activities established for team members, that team members are trained for conducting SQA activities, that the activities are conducted in a manner to ensure the quality of the I-MANAGE processes and success of the program. The SQA Manager will also ensure that SQA activities are assigned and that responsible members provide signature assurance of the processes and software. The SQA Manager is also responsible for ensuring that SQA activities are conducted in a manner that has the least possible impact on the I-MANAGE development and activities associated with fielding the system.

Each Project Manager is responsible for the conduct of SQA activities within his or her project. Projects Managers shall monitor the internal SQA activities and ensure that they are being performed as scheduled, that they are performed correctly and accurately, that each activity is recorded and that any problems found are reported and tracked. It is important to take credit for internal SQA activities that are part of the internal processes in each project and it is equally important to ensure the proper tracking of problems to understand their impact and reduce future resources spent on them.

SQA Team members and Project Team members will ensure that I-MANAGE SQA activities are conducted in a manner that ensures their highest accuracy and speed with the least impact on the I-MANAGE development activities. Team members are responsible for ensuring that they understand the SQA activities they conduct and are professional at all times.

Outside Assessors will be assigned depending upon the size and resources available of each project. Outside Assessors are responsible for providing an independent, outside review of I-MANAGE program and project SQA activities in the least intrusive and most cost effective manner possible, for providing accurate assessments and recommendations for improving processes and correcting problems.

Conducting SQA activities is essential to the success and integrity of the I-MANAGE Program and they are not done for the sake of doing them. SQA activities will be conducted to ensure the quality of the I-MANAGE processes and the success of the program.

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I-MANAGE Roles and Responsibilities

TASK	RESPONSIBILITY							
	Contractor Project Manager	Project Manager	Project Team	SQA Team	I-MANAGE SQA Manager	Outside Assessor	Program Manager	
POLICY, PROCEDURES AND GUIDELINES								
Establish SQA Team	X	X			X			
Establish-Publish Testing Schedule	X	X						
Establish-Publish Auditing Schedule					X			
Provide Assessment, Audit and Review Guidance					X			
Conduct Assessment, Audit and Review Training					X			
Approve Changes to Assessment, Audit and Review Guidance							X	
SQA ACTIVITIES								
Conduct Contractor CMM Level 3 SQA Activities	X							
Conduct Internal SQA Activities	X	X	P	P				
Provide Internal SQA Activities Reports	X	X						
Conduct Audits and Reviews	X	X	P	P	X			
Provide Audit and Review Reports					X			
Conduct Assessments and Stage Exit Reviews					X	P		
Provide Assessment Reports					X			
Approve Exceptions/Deviations							X	
X = RESPONSIBLE								
P = PERFORM								

2.2 Required Skills

The primary skill required for conducting the SQA activities is an understanding of the software testing process and the ability to validate tests conducted by the I-MANAGE Test Teams. A general understanding of the software development processes, the I-MANAGE Enterprise Architecture, the Department's accounting structure and the Department's offices and their inter-relationship is also necessary.

2.3 Required Training

Training requirements for personnel involved in SQA activities are focused on the understanding of the I-MANAGE processes. These personnel are chosen for their expertise as Subject Matter Experts (SME) in the processes, minimizing the amount of training required to correctly perform SQA activities while maximizing their effectiveness. Training in the conduct of Software Testing Audits (STAs) will be conducted for these personnel performing SQA activities in accordance with Appendix B (Audit Plan).

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3. Process Reviews

Reviews of the testing process are central to this SQA Plan and are primary tools for determining the quality of the testing processes. Two categories of reviews are used: Informal and Formal. The reviewing process is illustrated by the pyramid diagram below. At the bottom of the pyramid are the informal reviews that are conducted by the internal testing team themselves. These reviews are very numerous and consist of Peer Reviews, Structured Walk-Throughs and other internal “looks” at how well each team is performing the testing functions. Above the internal team internal reviews are the QA activities conducted by the I-MANAGE SQA organization. These reviews are less numerous than the team reviews and consist of audits of various types such as process audits and configuration audits and may be either scheduled or unscheduled. Finally, formal reviews are at the top of the pyramid in the diagram. These reviews will be conducted to provide the program Go/ No-Go decisions at critical points throughout the program lifecycle and consist of Formal Assessments and Stage Exit Reviews. These reviews should be conducted by members outside of the I-MANAGE program to provide a clear, unbiased snapshot of the quality of the program processes. Candidates for members to conduct reviews at this level are members from the IG, FMSIC, OMB and outside contractors. Participation in the I-MANAGE testing and SQA activities by the IG, FMSIC and OMB help to create a dialog that would be in ensuring that each project is meeting the expectations of the PMA and each organization’s expectations in general.

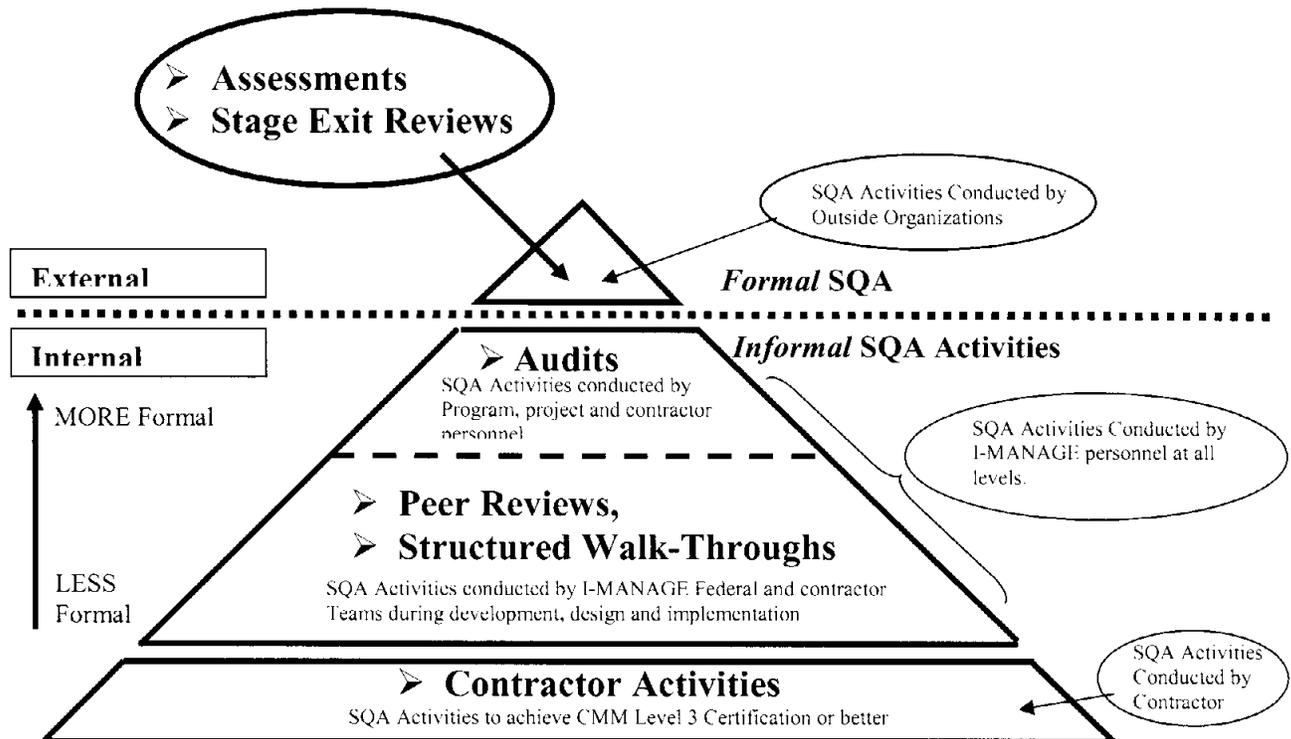


Diagram of I-MANAGE SQA Activities

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3.1 Review Checklists

Checklists will be used during each review and are an integral component to SQA. The checklists to be used have been derived from various expert sources such as the Carnegie-Melon Institute and Software Engineering Institute which sponsor the CMM quality methodology. CMM is recognized throughout the world as a leading methodology for QA. Additionally, checklists from DOE's Software Engineering Methodology will be used as appropriate. The checklists will be available online at the I-MANAGE web site.

3.2 Standards

DOE 203.1 Software Quality Assurance

3.3 Formal Reviews

Formal reviews should be conducted by OUTSIDE observers such as the IG, FMSIC, OMB or an outside contractor. Though outside observation is required to ensure CMM level-2 certification and adequate management control, observance and participation by OMB and FMSIC in particular provides a higher level of confidence that each system is meeting the requirements of the PMA. The SQA Manager should be the liaison between each I-MANAGE project/Project Manager and the outside observer.

At least one week prior to completion of a software unit, software module or integration package, the SQA Manager will review the Document List that is generated by the Development Team. This list identifies all the documents and revisions that will be submitted for the formal review and any documents related to the testing of the software. The SQA Manager will review software testing related documents identified on this list to ensure that the indicated revision is or will be available in time for the software to be placed into production. Discrepancies will be brought to the attention of the SDM and the associated Project Manager.

3.3.1 Stage Exit Reviews

A Stage Exit is the vehicle for securing the concurrence (i.e., approval) of designated individuals to continue with the project and move forward into the next stage of development. The concurrence is an approval (sign-off) of all draft deliverables, including the Project Plan, and selected stage work products produced to date. The deliverables and work products (if any) are assured via the QA Review process described below. The Stage Exit indicates that all issues/concerns have been closed or have an acceptable plan for resolution. Based upon information in the Stage Exit Review, the SQA Manager shall make a recommendation to the Project Manager and Project Test Manager on proceeding to the next stage.

Each Stage Exit Reviews shall be conducted by an outside assessor. If the project does not have an outside assessor assigned, then the SQA Manager, along with I-MANAGE program and project personnel, shall conduct the Stage Exit Reviews in a formal manner using SEI and DOE SEM checklists. The checklists will be available on the I-MANAGE website.

The purpose of a Stage Exit is to:

- Allow all functional areas involved with the project to review the current Project Plan. This includes, at a minimum, a detailed plan for the next stage, and high-level plans for the remainder of the project.

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- Provide a forum to raise issues/concerns if deficiencies exist that will negatively impact the Project Plan.
- Ensure an acceptable action plan exists for all issues/concerns raised.
- Obtain concurrence on current stage draft deliverables and begin the next stage of development.

Software development/integration project lifecycle stages may overlap beginning activities of the new stage, and ending activities of the previous stage.

The Stage Exit process begins with a notification to the extended development team that a stage exit has been scheduled. The process ends with receipt of concurrence from the designated approvers to proceed to the next stage. Concurrence indicates that all known issues have an acceptable plan for resolution.

The following are the minimum inputs to the Stage Exit process:

- System development lifecycle deliverable(s) (I-MANAGE POAM deliverables)
- Current Project Plan
- Issues to be addressed (generic)
- Concurrence/non-concurrence from the approvers
- Issues that remain open from the last QA Review Report

3.3.2 Assessments

Assessments will be conducted to determine the quality of the I-MANAGE processes and to ensure complete traceability from system requirements to design, to development, to testing and finally acceptance. Assessments are formal reviews of a process that are conducted infrequently (usually at the beginning, at the midpoint, and at the end of a system's development cycle). Information from the Assessment will be used to make adjustments or corrections to the program to ensure the quality of the I-MANAGE processes and success of the program. The results of the assessments should conclude that the I-MANAGE processes are at the Capability Maturity Model (CMM) Level 2 or higher. Prime contractor processes in software development will be at a CMM Level 3 or higher.

Assessments shall be conducted by an outside assessor. If the project does not have an outside assessor assigned, then the SQA Manager, along with I-MANAGE program and project personnel, shall conduct the Stage Exit Reviews in a formal manner using SEI and DOE SEM checklists. The checklists will be available on the I-MANAGE website.

3.3.3 Assessment Reports

The results of I-MANAGE Process Assessment will be discussed with the I-MANAGE Program Manager and the I-MANAGE Management Team and provided a copy of the report. A copy of each assessment will be kept by the SQA Manager for historical purposes.

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3.4 Informal Reviews

These audits will be conducted by the program, project and contractor personnel as an INTERNAL look at the I-MANAGE processes. These processes are broken into processes that are conducted just with the project team members such as Peer Review and Structured Walk-Throughs and those that are conducted with project team members in coordination with the SQA team such as Process Audits.

3.4.1 Process Audits

I-MANAGE program, project and contractor personnel will evaluate compliance of I-MANAGE processes with the SDP, SMP, CMP and Project Master Test plans. These plans will specify that the evidence of SQA is adequate to ensure compliance with project and contract requirements. Processes and testing will be audited to ensure a high level of confidence in the processes and testing being conducted. The purpose of the audits is to determine that the processes and testing are adequate to provide a system that is (1) technically and functionally accurate; (2) is numerically correct; and (3) and has adequate platform stability.

3.4.2 Configuration Audits

SQA activities will audit processes (specifically those pertaining to Configuration Change Orders) conducted by the Configuration Management team, and will not interfere with their conduct. Compliance to this plan will be assured by SQA auditing software Change Orders to ensure the following: an approved Configuration Change Order (an approved Configuration Change Approval form) is used to initiate the change; that the I-MANAGE Configuration Database is updated and that the item(s) requiring revision as indicated in the Configuration Change Order are identified and specified. The documentation of these audits will be maintained by the SQA Manager.

3.4.3 Scheduled Audits

The I-MANAGE SQA Manager, program, project and contractor personnel will generate and maintain an Audit Schedule. Audits will occur at the end of each development phase as indicated in the SMP. The results of audits will be discussed with the Project Manager and the individual most responsible for the process or the production of the deliverable being audited. Audits will focus on interface development and testing processes, areas with relatively higher risk of process failure and areas where the tolerance for risk is low, such as numerical accuracy of postings to the general ledger. Much less emphasis will be given to contractor processes regarding their tailoring of commercially obtained software packages. Proof of CMM Level 3 certification will be acceptable as a substitute for rigorous auditing.

3.4.4 Unscheduled Audits

The I-MANAGE SQA Team will perform random and unannounced audits to ensure the corrective actions improvements agreed to during the review of the results of the Scheduled Audits are being followed. Unscheduled audits will be conducted on the process requiring the corrective action or improvement as well as similar processes that could possibly have the same problem. The number of unscheduled audits will be determined to provide statistical confidence (Confidence Index) of 95% or greater. The results of audits will be discussed with the Project

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Manager and the individual most responsible for the process or the production of the deliverable being audited.

3.4.5 Audit Reports

Audit reports, and recommended corrective actions or improvements generated by the I-MANAGE SQA Team will be brought to the attention of the Project Manager and the individual most responsible for producing the software deliverable. Corrective action will be recommended as appropriate at that time. The SQA Manager will keep copies of the audit reports for the record.

3.4.6 Structured Walk-Throughs and Peer Reviews

Walk-Throughs and Peer Reviews will be conducted by the I-MANAGE Test Teams on a regular basis to assess the quality of work performed. Walk-Throughs and Peer Reviews will be conducted for unit, integration and interface development and will be scheduled near the mid point of developing unit modules. Additionally, a second Walk-through or Peer Review will be conducted at the end of the process to ensure that discrepancies found in the mid-point check were addressed and resolved and that no new problems developed.

It is preferred that a member or members outside of the group that performed the work or development conduct the review of the performance of work accomplished to provide a fresh second look. Although from another group, the reviewer should have some basic knowledge of the finished product being reviewed.

3.4.6.1 Design Walk-Throughs

The SQA Test Manager will be invited to all design walk-throughs throughout the entire software development life-cycle to ensure that peer and management reviews of the software design are conducted. The SQA Manager will ensure that a verifiable process is used to identify all action items generated during this review process. The SQA Manager will audit this process to ensure that all action items have been addressed.

3.4.6.2 Development Walk-Throughs

The SQA Manager will be invited to all code development walk-throughs to ensure that peer reviews of the development and testing processes are being conducted. The Project Managers will ensure that a verifiable process is used to identify all deficiencies or action items generated during this review process. The SQA Manager may then audit this process to ensure that all deficiencies or action items have been addressed.

3.4.7 Walk-Through and Peer Review Reports

The results of Walk-Throughs and Peer Reviews will be discussed at the end of the review with the Project Manager and a copy of the report will be kept by the SQA Manager. The Project Manager will be contacted immediately if a non-compliance issue is found during the review.

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3.4.8 Baseline Quality Reviews

These reviews will be conducted by the SQA Team prior to any baseline release of units, modules, or integration packages. This review ensures that: (1) the code has been tested and meets module specifications, except as noted; (2) any changes to applicable software module design documents have been identified; (3) the appropriate validation tests have been run; (4) that the functionality of the baseline is documented; (5) all software design documentation complies with this plan and other applicable I-MANAGE Program plans and procedures and (6) the tool and techniques used to produce and validate the Software are identified and controlled.

4. Testing Traceability

Traceability is identified through the use of a spreadsheet matrix and database which will tie individual System Requirements and Contract Specifications to a Test Script that is to test each requirement and specification and then to the actual conduct of the test. Audits of the Traceability Matrix shall be conducted by the SQA Team and the results provided to the Project Manager.

5. Software Configuration Management

An effective Software Configuration Management Plan is very important and essential to ensuring the integrity of software developed and subsequent versions. Software configuration management is the progressive, controlled definition of the shape and form of the software deliverables. It integrates the technical and administrative actions of identifying, documenting, changing, controlling, and recording the functional characteristics of a software product throughout its life-cycle. It also controls changes proposed to these characteristics. As the software product proceeds through requirements, analysis, implementation, test, and acceptance, the resulting programs are identified in the Software Development Plan. This assurance process occurs during the Baseline Quality Review mentioned above and its configuration becomes progressively more definite, precise, and controlled.

Software configuration management is an integral part of the project configuration management, using the same procedures for identification and change control that are used for documents, test verification procedures, and others. I-MANAGE will follow the instructions of the I-MANAGE Configuration Management Plan throughout the lifecycle of each project within the program.

6. Resource Estimates

The person-hours required to conduct SQA activities are:

- 10-20 Hours/Wk Independent Certification
- 20-40 Hours/Wk Field Site Activities
- 20-40 Hours/Wk Process Reviews
- 20-40 Hours/Wk Testing Oversight
- 8-16 Hours/Wk Administrative Processing

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7. Problem Reporting

Problems discovered after the implementation of a system shall be reported on a Problem Report (PR). A generic PR is presented in Appendix E. Problems discovered during software testing during development, design and implementation will be reported immediately along with the test results on the test script being used on a Problem Report. Most problems will be tracked by this method using a summary sheet for a complete listing of problems and errors discovered. Major problems, such as problems that have the potential to cause a delay in fielding a module, will be tracked more formally on an exception report (Appendix D). The exception report will be used to track problems that will affect the quality, performance or schedule of the system within a project. Exception reports must be approved by the Program Manager.

In addition, Problem Reports (PR) will be identified in Configuration Change Orders that resolve the issues brought up by the PR.

- When a release is identified with numeric revision, and is used by individuals outside of software development, a written means of problem identification is required to help ensure that the problems are attributed to the appropriate release. Anytime a problem is found and is attributed to software, a PR will be used. These PRs will be given to the software developer for evaluation and a copy will be kept by the SQA Manager.
- When a baseline release is identified with an alphabetic revision and is used during and after the Alpha release, all problems attributed to software will be recorded on PRs. These PRs will be evaluated and tracked by the Project Manager with assistance from SQA Team until no further action is required and the PR is marked closed. A master report file will be maintained by the SQA Manager which contains supplementary data such as failure analysis and records of meetings.

7.1 Exception/Deviation Reporting

Exceptions or Deviations that will affect the quality, schedule or performance of any I-MANAGE system or module will be reported by the SQA Manager to the Project Managers and the Program Manager on a regular basis. Serious concerns will be reported immediately. The Program Manager will make the decision regarding continuance of the project at each stage with regards to the exceptions or deviations. The Program Manager will also make the final acceptance decision prior to going “live” with each project based upon the exceptions and deviations presented to that point.

8. Complexity Determination

Complexity Determination is used to determine the number of test cases required to perform testing of the software with reasonable confidence that most problems or errors will be discovered. The greater the number of nested loops and paths in software, the greater number of chances for error. Software with large numbers of nested loops requires a larger number of tests to discover problems and ensure that a certain percentage of problems have been disclosed. Refer to McCabe, 1989 for further details. The determination of complexity as a tool is a rough estimate of confidence and should be used where possible and not be overly burdensome.

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The SQA Team will conduct a sample software complexity of the integration software. This determination will provide a level of assurance that the number of tests conducted on the integration software is sufficient to assure its quality. The integration software for calculating the complexity determination should be selected carefully so to expound as much utility from the exercise as possible. Though not practical or even likely in all cases, the selected software should be representative of as many integration packages as possible to give a rough indication of most integration packages.

Complexity calculations will not be done for the COTS software engine (Oracle 9i Database, Oracle 91AS and E-Business Suite 11i) because there is, by definition, no need to conduct tests on an off-the-shelf software package with no local development.

Appendix A: STARS Project Testing Checkpoints (STARS Only)

<u>Tests</u>	<u>Start Date</u>	<u>End Date</u>
Module Unit Testing	9/29/03	3/31/04
Integration Testing	10/1/03	3/31/04
Conversion Testing	2/24/04	3/31/04
Interface Testing	10/24/03	5/14/04
Report Testing	10/28/03	5/4/04
Acceptance Testing	6/2004	9/2004

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Appendix B: Audit Preparation

APPENDIX B Preparation for an I-MANAGE Software Quality Audit

January 2004

Rob Briede

United States Department of Energy

Office of Management Analysis/OMBE (ME-2.5)
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Abstract

This document will enable a site to prepare for a software quality audit by providing specific guidance. It will also provide guidance to a site that would enable it to perform a software quality audit.

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Section 1. Purpose

Software is becoming increasingly important to both production and administration operations within the Department of Energy. Many individuals involved with software are now being audited. The purpose of this document is to help those individuals better understand the software quality auditing process and their roles and responsibilities.

According to the Institute of Electrical and Electronics Engineers (IEEE Std 610.12-1990) a software audit is "An independent examination of a work product or set of work products to assess compliance with specifications, standards, contractual agreements, or other criteria."

The goal of I-MANAGE process and testing audits is to provide an independent determination as to whether the software and system development maintenance processes and their documentation are sufficient to the quality of the I-MANAGE system and success of the program.

An audit is usually conducted at one of the following times:

- A specific project milestone has been reached and an audit is initiated as planned or as required by the auditing organization's charter.
- External parties or customers request an audit of a specific item, at a specific date, or at a project milestone. This could be part of a contract agreement.
- An internal organization has requested the audit, establishing a clear and specific need.

An audit is not a software assessment. A software assessment appraises software processes and identifies potential areas for improvement.

A software quality audit is not much different than any other type of audit. Configuration items of software may sometimes be a little harder to put your finger on, but they are still auditable.

This document describes the mechanics of an audit and what individuals should expect. There are steps that the auditor and the auditee can take that make the results of the audit more positive. Many of the steps are discussed in this document.

The I-MANAGE process and testing audits assess the processes that determine the quality of the system's technical functionality, numerical accuracy and platform stability.

Section 2. Software Quality Audit Roles and Processes

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2.1 Roles and Responsibilities

A software quality audit involves:

- the Project Manager, person or organization which requests the audit,
- the auditor or team who performs the audit, and
- the auditee who is responsible for the process being examined.

To achieve a successful audit, the auditor and auditee must understand their roles and responsibilities. The auditor and the auditee can then improve communication, agree on findings, use the audit time more efficiently and make the overall audit more effective.

2.1.1 Project Manager

The Project Manager (i.e., person or organization) is responsible for authorizing the audit and for defining the scope and identifying the requirements of the audit. The management of the auditing organization assumes responsibility for the audit and allocates the necessary resources to perform the audit.

2.1.2 Auditor or Audit Team

The audit team performs the audit. The audit team is composed of one or more people. Normally, one individual is designated the lead auditor. It is the lead auditor's responsibility to organize and direct the audit and to coordinate the preparation and issuance of the audit report. The lead auditor is also responsible for:

- determining the team size,
- briefing team members on the audit scope and areas to be audited,
- providing background about the organization being audited,
- assigning the workload of who will audit what areas,
- determining the audit schedule,
- notifying and briefing the audited organization on the scope of the audit and materials that need to be provided,
- ensuring that the audit team is prepared to conduct the audit,
- ensuring that the audit plan or procedures are performed, and

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- issuing reports in accordance with the audit plan or procedures.

The I-MANAGE Audit Team will consist of combination of contractor personnel, federal staff members working on the Development or Design, Configure, Test Teams, and federal staff members familiar with the Department's accounting system, but working outside of the I-MANAGE program.

The audit team should have:

- auditor training, and
- technical expertise in the area being audited.

The audit team assists the lead auditor by helping prepare and review checklists, doing background work, conducting research, fulfilling their assigned part of the audit, and creating the report.

2.1.3 Auditee

The auditee is the party being audited. The auditee is responsible for:

- establishing a professional, positive attitude about the audit among the members of the audited organization,
- participating in the audit,
- providing all relevant materials and resources to the audit team,
- understanding the concerns of the auditors and verifying their factual accuracy,
- providing a response to the audit report, and
- correcting or resolving deficiencies cited by the audit team.

The I-MANAGE auditee will be the contractor or federal personnel responsible for conducting the development and testing processes being audited.

2.1.4 Others

An audit may include interested observers other than the Project Manager such as regulatory agencies. However, the role of the observer should be fully understood and agreed upon in the opening meeting.

2.2 Process

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An audit should be performed in accordance with documented plans and procedures. An audit consists of four phases: a planning phase, a performance phase, a reporting phase, and a follow-up phase.

2.2.1 Planning Phase

The planning phase should answer these questions:

- What is the audit's scope?
- What should the audit achieve?
- Does the audit cover the entire project? Does it cover the total system or part of the system?
- What is the authority for the audit?
- What background information is needed?

In the planning phase the Project Manager requests an audit. The scope and purpose of the audit are agreed upon by the Project Manager and auditor. The auditor forms an appropriate team and contacts the auditee. The auditors convey to the audited organizations the audit's purpose, scope, and authority (who or what authorizes the audit). This may be done by phone, letter or personal contact, followed by a written notification of the audit. The auditor will then request preliminary documentation needed for the audit. Typical documentation includes the organization's Quality Assurance Program Plan and organizational charts.

The auditor and auditee agree on the audit schedule, audit procedures or requirements, responsible people, and content of the audit. The auditor reviews the requirements imposed by the Project Manager on the auditee, which form the basis of the audit. An audit plan is developed and documented. Meeting rooms and other audit logistics are also discussed.

The auditor then reviews the available information, including previous audits and corrective actions. The auditor should have an understanding of the organization and the areas to be audited before the audit. Adequate familiarization should result in:

- accurate understanding of what the audit assignment really is,
- an effective audit program,
- spending an appropriate amount of time on each activity,
- emphasizing the significant findings and exemplary practices,
- understanding the information being gathered and

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- understanding the people in the audited organization and being able to communicate with them.

During the planning phase the auditee prepares for the audit. An audit coordinator, who has a thorough knowledge of the area of the audit, will make arrangements for the audit. People are selected to be principal points of contact for each task to be audited. Escorts are assigned to accompany the auditor during the audit. Both principal contacts and escorts should be prepared to clarify some of the answers of employees or place answers in the appropriate context.

The auditee should conduct a self-evaluation to prepare the employees for the audit and to identify any problems that can be fixed before the audit. The auditee locates and reviews procedures and records that the auditor requests to examine. The auditee locates office space and equipment the auditors will use during the audit.

The success of I-MANAGE SQA audits lies in the preparation phase. Scheduled audits are planned well in advance and communication is established between the auditors and the auditee. Auditors shall contact the auditee a week in advance and describe the audit environment, decide upon a meeting place, request documentation and provide any information to the auditee that would be helpful at that time.

2.2.2 Performance Phase

The performance phase of an audit consists of auditors interviewing, reviewing records, observing operations and collecting information. There are usually meetings by the audit team, as well as briefings to the auditee by the auditors to discuss observations. These are informal sessions usually held at the end of the audit. Their purpose is to share information such as facts, tentative conclusion, problems, etc. This allows everyone involved in the audit to understand where the audit is headed before the final report. During the performance phase the auditee gives the audit top priority. Questions should be answered promptly, accurately and honestly. The auditee can challenge the auditor if the auditor makes a dubious conclusion. More evidence may be presented or requirements reviewed to substantiate the challenge. If problems are discovered, the auditee should correct them immediately, if possible, and inform the auditors.

The performance phase has three main activities:

- Opening meeting
- Performance of the Audit
- Closing Meeting

2.2.2.1 Entrance Meeting

The audit starts with an opening meeting in which the scope of the audit is reviewed, schedules are determined, auditor and auditee personnel are introduced, and logistics, tests scripts or other test information being audited and the time for the closing meeting are determined. The auditor

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will communicate to the auditee the audit's objectives, areas of concentration as seen by the auditor and a preliminary assessment of the organization. The lead auditor will establish the audit's tone, sense of cooperation, and act as a seeker of information and facts. The audit team will describe the audit process, clarify any administrative matters and solicit the auditee's input.

I-MANAGE entrance meetings should take no more than 30 minutes. The exact portion of the process or test being audited will be communicated to the auditee at that time and associated documentation such as relative test scripts or sign-off sheets shall be given to the auditor. A brief review of the audit process will be given by the auditor along with a brief question and answer period.

2.2.2.2 Performance of the Audit

Guided by their checklists, the auditors check compliance with requirements by reviewing written instructions and procedures, conducting interviews, checking records, and observing processes and test activities. They follow up on questions that arise during these checks and observations, and assemble factual evidence of the auditee's compliance with process procedures and effectiveness in achieving the goals of their organization. The audit records include auditors' notes from interviews and observations, and photocopies of examples from the record reviews. The facts noted in the audit are reviewed by the lead auditor and conclusions are drawn as to the existence and extent of deficiencies or good practices.

The performance of I-MANAGE SQA audits shall be expedited as much as possible by preparation of the audit team. The entire audit shall take no more 4 hours in the manner of an analytical spot-check of a recently performed process and less like an administrative tasking. If a problem arises in a check that can not be easily resolved, then that check should be set aside and addressed at a later date and the next check started. It is important, though, to go back and readdress the unresolved check to determine the results of the audit and to ensure its integrity.

2.2.2.3 Exit Meeting

The performance phase of an audit ends with the closing meeting or exit interview where the lead auditor reports the audit team's conclusion. This is the last opportunity for the auditee to provide input to the audit.

I-MANAGE exit meetings shall be expedited and should be conducted as soon after the audit as possible. The lead auditor should explain to the auditee the results of the findings and discuss the information that will be available in the permanent records and forwarded to the Project Manager and pertinent I-MANAGE staff.

2.2.3 Reporting Phase

The lead auditor is responsible for generating the audit report that is the product of the audit. Team meeting discussions and the facts collected will help guide the report.

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At the closing meeting, the lead auditor will provide a summary of the written report. The summary allows for factual corrections and explanations.

The report usually consists of an introduction, purpose, scope, findings, observations, exemplary practices, and response requirements.

The report is mailed to the Project Manager, the auditee and the audit team.

I-MANAGE audit reports shall be completed and distributed within two days after finishing the audit.

2.2.4 Follow-up Phase

If problems were discovered during the audit, the auditee proposes corrective actions, which may be reviewed by the Project Manager or auditor. The resolution of a problem requires three steps that should be outlined in a corrective action plan:

- correction of the specific deficiency found,
- resolution of the root cause of the problem,
- setting a date when corrective action will be in place to prevent a recurrence.

A follow-up audit may be required or requested to verify each finding is resolved by a proposed corrective action, the corrective action has been implemented, and the problem has been resolved. The follow-up activities include: evaluation of the response, re-audit, closing and documentation. The auditor is responsible for requesting a timely response from the auditee. The authority for evaluating the adequacy of the response is normally delegated to the auditor who performed the particular audit. When all the findings have been resolved, the auditee is notified that the audit is closed.

The closing activity is the final acknowledgment that the audit is formally and officially at an end. The documentation activity includes the collection and filing of all the documentation related to the audit. Normally the lead auditor receives all the information for storage.

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Section 3. How the Auditor Prepares for the Audit

I-MANAGE testing and process audits will be performed at the conclusion of a major activity of work, as scheduled and as requested by the Project Manager or Program Manager. The auditing organization then assigns a lead auditor who will work with the Project Manager to decide the purpose of the audit, the audit's scope, the standards or documents to be used, the schedule and time frame for the audit, and the commitment of resources necessary to meet the audit's scope and depth.

Once these decisions are made, the lead auditor should make the initial contact, usually informal (for example, a phone call) with the auditee. This is to notify the auditee that an audit is going to be conducted and to establish a date for the audit within the Project Manager's time frame.

Information regarding what will be audited and reviewed should be discussed with the Project Manager at this time. The lead auditor should request the information and paperwork at this time necessary to perform as much of the preliminary review as possible. The information should be delivered to the lead auditor at least two days prior to the start of the audit.

3.1 Preliminary Review

As a planning basis for the audit, the lead auditor should perform an analysis of the applicable requirements. This review should be conducted at least 2 days prior to the start of the audit. This preliminary review or a "desk audit" will look at the auditee's procedures, instructions, or recorded descriptions for meeting these requirements. If the lead auditor finds major problems during the preliminary audit then the planning phase should be suspended until these major issues can be resolved.

If no major problems are found, the lead auditor provides the auditee with a formal notification of the audit. This notification should contain the objective and scope of the audit, a preliminary schedule, and a request for the names of the people responsible for each task or area to be audited. Also, at this point the lead auditor assembles an audit team if the scope of the audit warrants.

The I-MANAGE audit Preliminary Reviews are important in ensuring that actual audit time is minimized as much as possible through audit preparation.

3.2 Preliminary Audit Plan

The lead auditor is responsible for producing a preliminary audit plan. This plan may change during the performance phase of the audit with the approval of the lead auditor, the Project Manager, and the auditee. According to ISO 9000, the preliminary plan should contain the following:

- **audit objective and scope,**

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- **identification of the individuals having significant direct responsibilities regarding the objectives and scope,**
- **identification of reference documents (such as the applicable quality system standard and the auditee's quality manual),**
- **identification of audit team members,**
- **the language of the audit,**
- **the date and place where the audit is to be conducted,**
- **identification of the organizational units to be audited,**
- **the expected time and duration for each major audit activity,**
- **the schedule of meetings to be held with auditee management,**
- **confidentiality requirements,**
- **audit report distribution and the expected date of issue.**

This plan should be approved by both the Project Manager and the auditee and any issues should be resolved before the audit's performance phase begins.

3.3 Additional Documentation

The lead auditor, together with the audit team, should prepare the checklists that will be used to evaluate each audit task or area. Additionally, they should prepare any forms for recording and collecting the necessary information to document their observations throughout the audit.

Section 4. How the Auditee Prepares for an Audit

When an organization receives notice of an audit, it should begin planning for the audit. Preparing for an audit is simplified if the audited organization conducts frequent, routine self-assessments or internal audits to ensure work is being done in compliance with the requirements.

Whether or not these self-assessments or internal audits are in place, the following planning activities will help the audited organization through the planning phase.

4.1 Understand and Communicate the Scope and Objectives of the Audit to Relevant Members of the Organization.

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Audits will be scheduled, random or prompted by changes in the organization's quality process, product, or as a follow up to a previous audit. An audit is initiated to evaluate an organization's compliance with a set of requirements or standards. It is important for the audited organization to have the knowledge of the requirements or standards at a level equal to or higher than the auditor. This will help eliminate any instances where an auditor imposes a condition that is not a requirement, and facilitate the timely resolution of issues.

4.2 Locate and Review Material as Requested by the Auditors

The auditee is responsible for providing access to all procedures and records that the auditors request to examine. Therefore, the auditee should locate all of the required manuals, records and documentation, and make certain they are available, adequate and up to date.

If time permits, a self assessment or work area review should be performed. This helps prepare the employees for the audit. It also verifies that everyone is working to the correct procedures or requirements and identifies any areas where corrective action can be taken before the start of the audit's performance phase.

Section 5. How the Auditor Acts During an Audit

The actual audit is usually conducted through interviews with personnel in the audited organization and through documents and records review. Here are several useful techniques auditors should use when conducting interviews.

- Listen. It is difficult to gather information if you are talking.
- Listen ACTIVELY. Do not formulate new questions while interviewees are responding to previous ones. Don't only listen for the "bottom line."
- Observe the interviewee's body language and monitor your own body language to reflect listening, understanding, and empathy.
- Take notes and explain why you are taking them.
- Question. Start with open-ended questions, e.g., why, when, how, who, what, where, to what extent. Keep questions short and to the point. Move to close-ended questions, answered by yes or no, to start the clarification process.
- Clarify details to make sure the information received is clear and complete. Use follow-up questions for more information. Use paraphrasing and repeating to ensure that you heard correctly, and summarize to validate information.

To ensure the success of an audit it is important for each auditor to:

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- establish a rapport with the interviewee,
- avoid nit-picking or judgmental comments about individuals,
- avoid placing blame or fault for problems,
- and always operate ethically.

Remember you are taking up the valuable time of the auditee so minimize intrusions and avoid wasting time. The use of a checklist will help in this process by providing structure to the line of investigation and documenting results. Here is a list of additional tips in conducting a successful audit.

- Rely upon objective evidence and maintain objectivity.
- Use random sampling to get representative results.
- Obtain confirmation or explanation of apparent problems or concerns.
- Revisit if needed.
- Document results and retain notes.
- Get a positive "ID" of persons contacted.
- Report known problems and avoid opinions.
- Avoid surprises: keep your contacts informed.

Section 6. How the Auditee Acts During an Audit

During the audit, the audited organization personnel must maintain a professional image and interact with the audit team. Audit team members should not be allowed to wander freely and unescorted through the audited organization. Although there will ordinarily be fairly stringent rules limiting the help an employee may be given in answering questions, a knowledgeable person, or supervisor, should accompany auditors at all times. Questions will arise concerning specific terminology and semantic differences between the audited organization and the audit team. A knowledgeable person needs to be present to "interpret" in these instances.

In order to avoid surprises, audit team members and supervisors of the audited organization need to meet as quickly as possible after an apparent major discrepancy has been identified. The sooner communications can be established regarding an apparent major discrepancy; the sooner any misunderstanding about the finding can be clarified.

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Potential candidates for interviews with auditors should be briefed and coached before the audit begins as to what to expect and how to react during the audit. Clerical staff should be instructed to keep files as clean and orderly as possible and to be as responsive as possible in retrieving information requested by the audit team.

Section 7. How the Auditor Should Handle Audit Results

Although many audit reports have addressed only negative points, experience clearly shows that the credibility and acceptance of audit reports are substantially improved if they include an assessment of over-all performance. "How well are we doing?" is a fair question, and some statement of the audit team's opinion will go a long way in getting the auditee's management attention. Auditing organizations should identify three types of results during the course of an audit:

1. Exemplary Practice -- A practice, procedure, or instruction that is well above the expected norm of performance.

2. Deviation or Finding –

- Any nonconformance or inadequacy which results in a product nonconformance to a specified requirement,
- or the lack of a system or controls to satisfy a customer or system requirement,
- or any nonconformance to a procedural requirement or inadequate procedure which causes the conformance of product, practices, or activities to be unknown.

3. Observation -- An opinion regarding a condition not covered by a specific requirement; or a procedure, practice, or instruction whose effectiveness could be improved.

Typically observations and exemplary practices do not require a response from the audited organization. The term "exemplary practice" should be reserved for those very few instances where the auditee:

- has established an elegant, effective system,
- has developed an unusually high degree of awareness and cooperation internally,
- or has adopted a practice that is clearly superior to anything you have seen elsewhere.

The lead auditor has the responsibility to:

- Review each deviation noted and discuss any ambiguous or conflicting observations with the auditor(s).

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- Verify that the deviation is a "condition adverse to quality," or a "statement regarding noncompliance with established policy, procedures, etc."
- Remain aware that one objective of auditing is to induce performance improvement. This requires that deviations, in particular, be stated in terms that will arouse management interest, and as a minimum, convince them that there are significant problems which need to be investigated.
- Ensure that each final deviation is a clear, concise statement of a problem.
- Resolve any possible differences or discrepancies among the audit team.

The lead auditor should use discretion in keeping the audited organization(s) and appropriate manager(s) abreast of the audit in progress:

- A guiding factor would be severity and safety impact of the deviation(s).
- Those conditions which require prompt corrective action should be reported immediately to the audited organization.

The lead auditor usually conducts the closing meeting. The following items are a portion of the closing meeting:

- Verbally report audit findings to the audited organization's representatives.
- Call upon individual auditors for additional input.
- Explain that the deviations are "draft" until the audit report is issued and may not appear on the audit report if found unwarranted

The lead auditor will prepare an audit report. Care should be taken to ensure the audit report is specific in content and contains no ambiguities. The audit report includes the following:

- (a) Audit Report Cover Sheet,
- (b) Audit number,
- (c) Audited organization or activity,
- (d) Date of audit,
- (e) Scope of audit,
- (f) Audit team with lead auditor identified,
- (g) Executive Summary of audit results,

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The Executive Summary will briefly state whether applicable program elements have been implemented, based upon an evaluation of the audited organization's performance. The number of deviations, observations or exemplary practices should be included.

(h) Exemplary Practices, if applicable

(i) Requirements or Deviations, if applicable

(1) List the requirement first with the deviation statement next. Include deviation(s) identified, corrected, and verified, prior to the close out meeting, with an explanation of completed corrective action.

(2) Request corrective action for unresolved deviations.

(j) Observations, if applicable,

(k) Key personnel contacted,

(l) Documents reviewed, and

(m) Applicable signatures.

Unresolved deviations require Corrective Actions or Plans from the audited organization:

- Corrective Actions usually require that a response containing the following, as applicable, is submitted to the auditing organization within 30 days from the date of the published report. Information should include:
 - (a) Corrective action to correct the unresolved deviations identified in the written audit report.
 - (b) Cause identification.
 - (c) Actions to prevent recurrence.
 - (d) Lessons learned.
 - (e) Actions to be taken for improvement.
- Deviations not corrected within the 30-day response period require a Plan of Action and Milestones (POAM) including a milestone schedule for each deviation.

The Auditing organization should:

- Provide guidance for unacceptable corrective action,
- Request review by appropriate management for unacceptable corrective action,

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- Provide notification of inability to verify or validate completion of acceptable corrective action, with a copy to their Project Manager,
- Determine acceptability of corrective action,
- Evaluate overdue response or corrective action correspondence,
- Approve corrective action, and see it through: Evaluation, Verification and Closure of Corrective Action.

Section 8. How the Auditee Should Handle Audit Results

The audited organization should attempt to maximize its benefit from the audit. Where exemplary practices were noted by the auditors, those practices may be publicized and their use reinforced where applicable. Observations, conveying an auditor's opinion that best management practices were not followed, should be evaluated and may serve to improve beyond simple compliance and help to achieve excellence. Exemplary practices and observations do not require a response to the auditing organization.

Deficiencies normally require response from the auditee to the auditing organization. Maximizing the benefit from deficiencies requires several steps to be taken by the auditee, and is part of the proactive approach provided here. Site procedures must be followed, and generally include these steps:

1. Verify the factual accuracy of each deviation statement. This may require checking with the persons interviewed by the auditor, reading the documents that the auditor read, or observing an activity that was observed by the auditor. Finally, verify that the requirement cited is applicable to the activity and was correctly interpreted by the auditor.
2. Identify the scope of the deficiency. While the auditors may have found one or two instances, there could be more that were not observed by the auditors due to their limited time and resources. Corrective actions are needed for all instances, whether found by the audit or not.
3. Identify the person(s) responsible for corrective actions. Generally, site procedures and organizational charters will guide this step. Deficiencies covering more than one parallel organizational unit are normally addressed by the next higher level of management.
4. Once responsibility has been assigned and accepted, a corrective action plan is made for each deficiency. This plan, with brief action statements and stated or clearly defined deliverables and due dates, can become part of the response to the auditing organization.

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5. Each deficiency should be graded for significance. High risk, safety related deficiencies are normally given priority for correction. Some deficiencies have so little consequence that they are noted and no corrective action is taken, where this is agreed to by Project Managers and regulatory authorities.
6. Root cause analysis should be considered for the more significant deficiencies. This may lead to an improved corrective action plan that prevents recurrence.
7. Where corrective actions cannot be completed for a long time, mitigating actions for the short term should be included in the plan as needed.
8. Tracking the corrective actions in a management commitment system is done to ensure an orderly completion and to provide a means for changing dates, responsible persons, and details of the action.
9. Verification of completed actions by assembling evidence files, re-audit, or other means allows closure in the tracking system.
10. Lessons learned from the audit, root cause analysis, and corrective actions should be written and disseminated to those who can apply them in their activities. Sometimes exemplary practices noted in the audit report are the basis for a positive lesson.

Section 9. References

1. IEEE STD 1028-1988-IEEE Standard for Software Reviews and Audits.
2. ISO 10011-1:1990(E) Guidelines for auditing quality systems, Part 1: Auditing.
3. Dept. of Energy QC-1

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Appendix C: SQA Activities Schedule

SCHEDULE OF I-MANAGE SQA ACTIVITIES					
ACTIVITY	PROCESS TO BE REVIEWED	PROPOSED DATE	START DATE	TEAM RESP.	PROJECT
Process Audit Primer	Integration Tests; Module Unit Tests	2/4-5/04	2/4/04	DCT	STARS
Process Audit	PO, GL, AP, AR, AF Conversion Unit Testing	2/5-6/04	2/5/04	DEV	STARS
Process Audit	December Integration Tests; December Unit Module Tests	2/5-6/2004	2/5/04	DCT	STARS
Random Process Audit	Integration Tests; Module Unit Tests	2/5/04-4/6/04	2/5/04	DCT	STARS
Random Process Audit	Integration Tests; Module Unit Tests	2/5/04-4/6/05	2/5/04	DCT	STARS
Process Audit	Interface End-End Testing	2/9-11/04	2/9/04	DEV	STARS
Process Audit	Report Unit Testing	2/9-11/04	2/9/04	DEV	STARS
Process Audit	Testing Accountability Matrix	2/13-18/04	2/13/04	DEV	STARS
Process Audit	Physical Data Model Tests	2/19-20/04	2/19/04		IDW
Process Audit	January Integration Tests January Module Unit Tests	2/19-20/04	2/19/04	DCT	STARS
Process Audit	February Module Unit Tests	2/27-28/04	2/27/04	DCT	STARS
Process Audit	February Integration Tests	3/18-19/04	3/18/04	DCT	STARS
Process Audit	Report Unit Testing	3/22-24/04	3/22/04	DEV	STARS
Process Audit	Data Transformation System Design Tests	3/22-23/04	3/22/04		IDW
Process Audit	Interface End-End Testing	3/25-26/04	3/25/04	DEV	STARS
Process Audit	Simulated Conversion Testing	3/30-31/2004	3/30/04	DEV	STARS
Process Audit	Data Presentation Tests	3/30-31/04	3/30/04		IDW
Stage Exit Review	Conversion Unit Testing	3/31/2004	3/31/04	DEV	STARS
Process Audit	March Module Unit Tests	4/1-2/04	4/1/04	DCT	STARS
Process Audit	Portal Tests	4/5-6/04	4/5/04		IDW
Stage Exit Review	Integration, Unit Module Tests	4/5-6/04	4/5/04	DCT	STARS
Process Audit	Testing Accountability Matrix	4/12-15/04	4/12/04	DEV	STARS
Process Audit	Firewall Testing	4/28-30/04	4/28/04	DCT	STARS
Process Audit	Stress Testing	5/3-5/04	5/3/04		IDW
Process Audit	Stress Testing	5/3-5/04	5/3/04	DCT	STARS
Process Audit	Report Unit Testing	5/5-7/04	5/5/04	DEV	STARS
Stage Exit Review	Report Unit Testing	5/7-10/2004	5/7/04	DEV	STARS
Assessment	Conversions, Interfaces, Reports	5/10-11/04	5/10/04	DEV	STARS
Assessment	IDW Tests	5/17-19/04	5/17/04		IDW
Process Audit	Interface End-End Testing	5/17-19/04	5/17/04	DEV	STARS
Stage Exit Review	Interface End-End Testing	5/19/2004	5/19/04	DEV	STARS
Stage Exit Reviews	Unit Tests	6/16-18/04	6/16/04		IDW
Stage Exit Reviews	System/Integrations Tests	6/23-25/04	6/23/04		IDW
Stage Exit Reviews	Acceptance Tests	8/23-25/04	8/23/04		IDW

I-MANAGE PROGRAM

Appendix D: Exception Reporting Form

Department of
Energy
I-MANAGE
Program

I-MANAGE EXCEPTION REPORT

CONFIDENTIAL

PROBLEM REPORT NO. _____

REPORTED BY: _____

DATE ___/___/___
DAY MO YEAR

PROGRAM _____ RELEASE _____ VERSION _____

REPORT TYPE: (Circle)

- 1 - Coding Error
- 2 - Design Issue
- 3 - Suggestion
- 7 - Other: _____
- 4 - Documentation
- 5 - Hardware
- 6 - Query

SEVERITY (Circle): 1 - Fatal 2 - Serious 3 - Minor

ATTACHMENTS (Y / N) If Yes, Describe

PROBLEM SUMMARY: (Describe only Problem, Ex: "System crashes upon execution")

HOW DOES THIS AFFECT QUALITY, SCHEDULE OR PERFORMANCE?:

PROJECT MANAGER SUGGESTION:

.....
SIGNATURES:

Project Manager Signature

Date

Program Manager ACTION INSTRUCTIONS (continue, fix then continue, etc):

Program Manager Signature

Date

BRIEDE:G/I-MANAGE/EXCEPTION REPORT BLANK

CONFIDENTIAL

I-MANAGE PROGRAM

Appendix E: Generic Problem Report

Department of Energy I-MANAGE Program	I-MANAGE PROBLEM REPORT	<i>CONFIDENTIAL</i>
	PROBLEM REPORT NO. _____	
REPORTED BY: _____	DATE ____/____/____ DAY MO YEAR	
PROGRAM _____	RELEASE _____	VERSION _____
REPORT TYPE: (Circle) 1 - Coding Error 2 - Design Issue 3 - Suggestion 7 - Other: _____	4 - Documentation 5 - Hardware 6 - Query	SEVERITY (Circle): 1 - Fatal 2 - Serious 3 - Minor ATTACHMENTS (Y / N) If Yes, Describe
PROBLEM SUMMARY: (Describe only Problem, Ex: "System crashes upon execution") _____ _____		
CAN YOU REPRODUCE THE PROBLEM? (Circle): ALWAYS / SOMETIMES / NO		
HOW TO REPRODUCE IT: _____ _____		
SUGGESTED FIX OR CORRECTION: _____ _____		

<i>(FOR USE BY DEVELOPMENT TEAM ONLY)</i>		
FUNCTIONAL AREA: _____	ASSIGNED TO: _____	
STATUS (Circle): 1 - OPEN 2 - CLOSED	PRIORITY, 1 to 5: _____	
RESOLUTION (Circle) 1 - Pending 2 - Fixed 3 - Irreproducible	4 - Deferred 5 - As Designed 6 - Can't be fixed	7 - Withdrawn by Reporter 8 - Need More Information 9 - Disagree with Suggestion (PLACE REASON ON BACK)
RESOLUTION VERSION _____		
RESOLVED BY: _____	DATE ____/____/____ DAY MO YEAR	
RESOLUTION TESTED BY: _____	DATE ____/____/____ DAY MO YEAR	
BRIEDE:G/IMANAGE/TESTING-QA/PROBLEM REPORT BLANK		
<i>CONFIDENTIAL</i>		