

SJ-RT

Smith Jones Rapid Transit

Software Quality Assurance Plan

February 1997

DRAFT



U. S. DEPARTMENT OF ENERGY

Replace with appropriate organization name

Change Control Page

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Table of Contents

1. Introduction.....	1
1.1 Purpose and Scope	1
1.2 Reference Documents	1
1.3 Project Checkpoints (Stage Exits)	1
2. SQA Description.....	2
2.1 SQA Roles and Responsibilities	2
2.2 Required Skills.....	3
3. Audits and Reviews	4
3.1 Standards.....	4
3.2 In-Stage Audits and Reviews.....	4
3.3 Stage Exit Reviews	8
3.4 Peer Reviews.....	11
4. Verification and Validation of Requirements.....	12
4.1 Verification	12
4.2 Validation.....	13
5. SQA Milestones.....	14

Preface

Document Version Control: It is the reader's responsibility to ensure they have the latest version of this document. Questions should be directed to the owner of this document, or the project manager.

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Privacy Information

This document may contain information of a sensitive nature. This information should not be given to persons other than those who are involved in the SJ-RT project or who will become involved during its lifecycle.

Please note: the statement above is for demonstration purposes only. There is no privacy information included in this example document.

1. Introduction

This Software Quality Assurance Plan (SQAP) sets forth the process, methods, standards, and procedures that will be used to perform the Software Quality Assurance function for the Smith Jones Rapid Transit (SJ-RT) project. The SQAP follows the DOE Software Engineering Methodology (SEM), modified to accommodate the project model adapted for the SJ-RT project.

1.1 Purpose and Scope

This SQAP provides a foundation for managing the SJ-RT software quality assurance activities, and is based on project activities and work products as documented in the SJ-RT Project Plan. This plan:

- Identifies the SQA responsibilities of the project team and the SQA consultant
- Defines SJ-RT reviews and audits and how they will be conducted
- Lists the activities, processes, and work products that the SQA consultant will review and audit
- Identifies the SQA work products

1.2 Reference Documents

Reference materials used to develop the SJ-RT SQAP include:

- DOE Software Engineering Methodology, March 1996
- ANSI/IEEE Standard for Software Verification and Validation Plans
- Software Engineering Institute, SQA Key Process Area

1.3 Project Checkpoints (Stage Exits)

Each stage of development will have at least one formal checkpoint called a stage exit. When a stage has been successfully exited, it indicates that all draft deliverables due to date have been completed, all outstanding issues have acceptable action plans, and there is a sound plan for the remainder of the project (detailed for the next stage). The project's designated approvers (sign-off authorities) must provide a written position of concur/non-concur at stage exit. All affected functional areas involved in the project also participate in and can provide input to the stage exit.

2. SQA Description

2.1 SQA Roles and Responsibilities

The following chart defines the SQA roles and responsibilities of the members of the project team and their function at stage exit.

Note: Due to staffing fluctuations, if a particular person is unable to fulfill his/her responsibilities, it will be the responsibility of the manager overseeing that area to ensure a replacement, with appropriate skills and experience, on a timely basis.

Role	Name	Org.	SQA Responsibility	Stage Exit Function
QA Manager	V. Domenico	DOE Software Mgmt.	Manages the Quality Assurance function.	Approve (delegated to QA consultant)
System Owner	M. Raffaello	HR-XXX	Helps define product quality expectations. Represents procurement users. Determines final acceptance of SJ-RT.	Approve
QA Consultant	G. Garibaldi	DOE Software Mgmt.	Audits and approves project deliverables from QA perspective. Reviews plans and deliverables for compliance with applicable standards. Provides guidance and assistance on process matters.	Approve
Project Manager	A. Michelangelo	Software Development	Ensures implementation of quality activities. Coordinates resolution of issues. Provides regular and timely communications.	Conduct
Project Manager's manager	A. Dante	Software Development	Monitors implementation of quality activities. Receives reports on SJ-RT quality efforts. Resolves conflict across organizations.	Approve

2.2 Required Skills

The Quality Assurance consultant must be able to review iterations of the Project Plan and lifecycle work products to determine adherence to DOE and industry standards, as modified and documented in the Project Plan, and provide expert assistance on project management practices and software development process related matters.

This position will work independently from the development team to ensure objective audits of the work products as they are being developed and objective reviews of project management processes and stage exits.

3. Audits and Reviews

3.1 Standards

The SJ-RT Project Plan will follow the DOE Software Engineering Methodology (SEM) standard and the DOE Project Plan Example. All lifecycle work product standards are documented in the SJ-RT Project Plan. They include the following:

- ANSI/IEEE Guide to Software Requirements Specifications
- IEEE Guide to Software Design Descriptions
- IEEE Standard for Software User Documentation

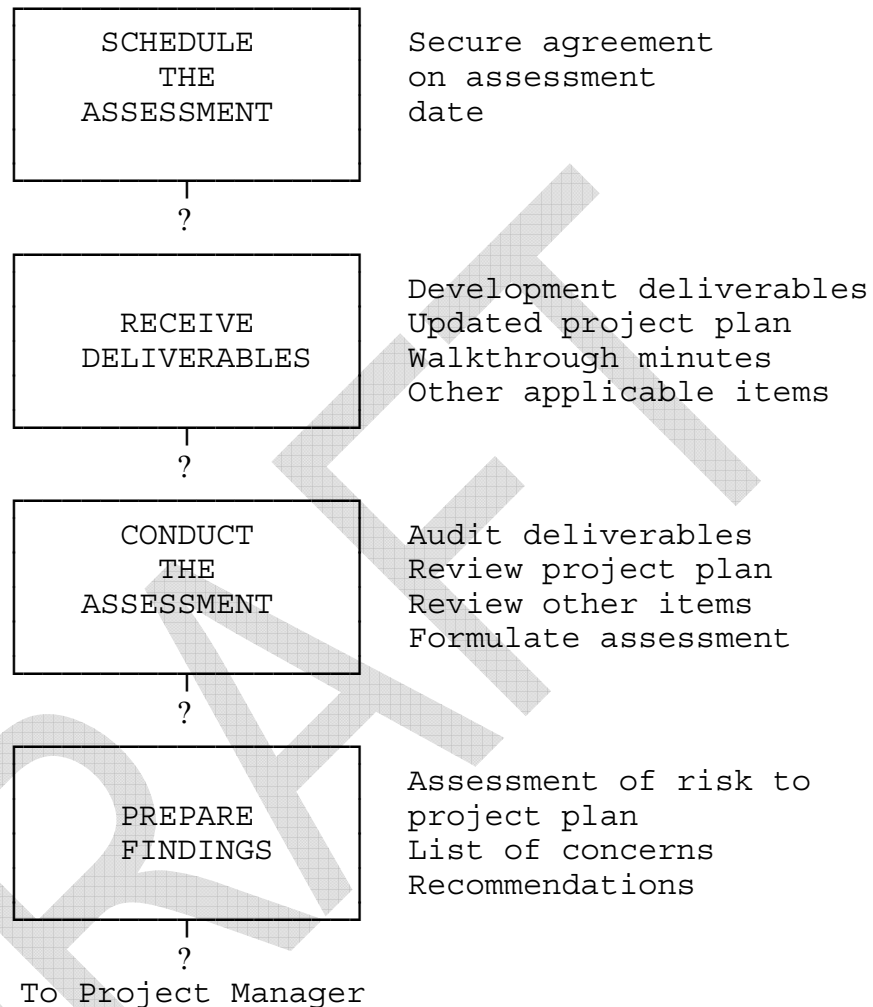
3.2 In-Stage Audits and Reviews

Quality Assurance for this project will include at least one audit of all current draft deliverables and selected work products in each stage of development. The reviews will assure that the established system development and project management processes and procedures are being followed effectively, and exposures and risks to the current Project Plan are identified and addressed.

In-stage reviews, hereinafter referred-to as **In-Stage Assessments** (ISA), will be performed and documented by the SJ-RT Quality Assurance consultant, in accordance with the DOE SEM In-Stage Assessment Process Guide.

The following diagram depicts the In-Stage Assessment process flow for all SJ-RT development stages:

In-Stage Assessment Process



Each deliverable and/or selected work product will be audited to make judgements as to the quality and validity of the deliverable or work product. The assessment will include any verification or validation activities performed since the last In-Stage Assessment. The reviewer will document the results of the assessment using the In-Stage Assessment Report described below.

An issue will be logged if there is a problem without a visible plan for resolution. Once a list of issues has been compiled, it will be reviewed with the project manager to see if any new or additional information might mitigate or eliminate any of them. Remaining issues must be addressed with an action plan from the project manager. Issues from an In-Stage Assessment near the end of a stage might become "qualifications" to the current stage exit.

An assessment of risk to the schedule for both the next stage and the remainder of the project, from the ISA reviewer's (QA consultant) perspective, will also be provided. Risk categories are as follows:

- Low - Potential or existing problems must be addressed to avoid an impact to the current Project Plan. This would also apply if no issues were identified.
- Medium - Problems exist that have a high probability of impacting the current Project Plan or other dependencies.
- High - Serious problems exist (without an acceptable plan to resolve) that have a high probability of impacting user acceptance, the current Project Plan, or other dependencies.

In-Stage Assessment Report

Project Name _____

Stage of development _____ Date _____

Reviewer _____ Phone _____

No.	Issues/Concerns:	Resolved
—	_____	_____
—	_____	_____
—	_____	_____
—	_____	_____
—	_____	_____
—	_____	_____
—	_____	_____
—	_____	_____
—	_____	_____
—	_____	_____
—	_____	_____

Assessment of risk to schedule:

Low

Medium

High

G

G

G

For the next stage

G

G

G

For the remainder of the project

3.3 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 In-Stage Assessment process described previously. The Stage Exit indicates that all qualifications (issues and concerns) have been closed or have an acceptable plan for resolution.

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

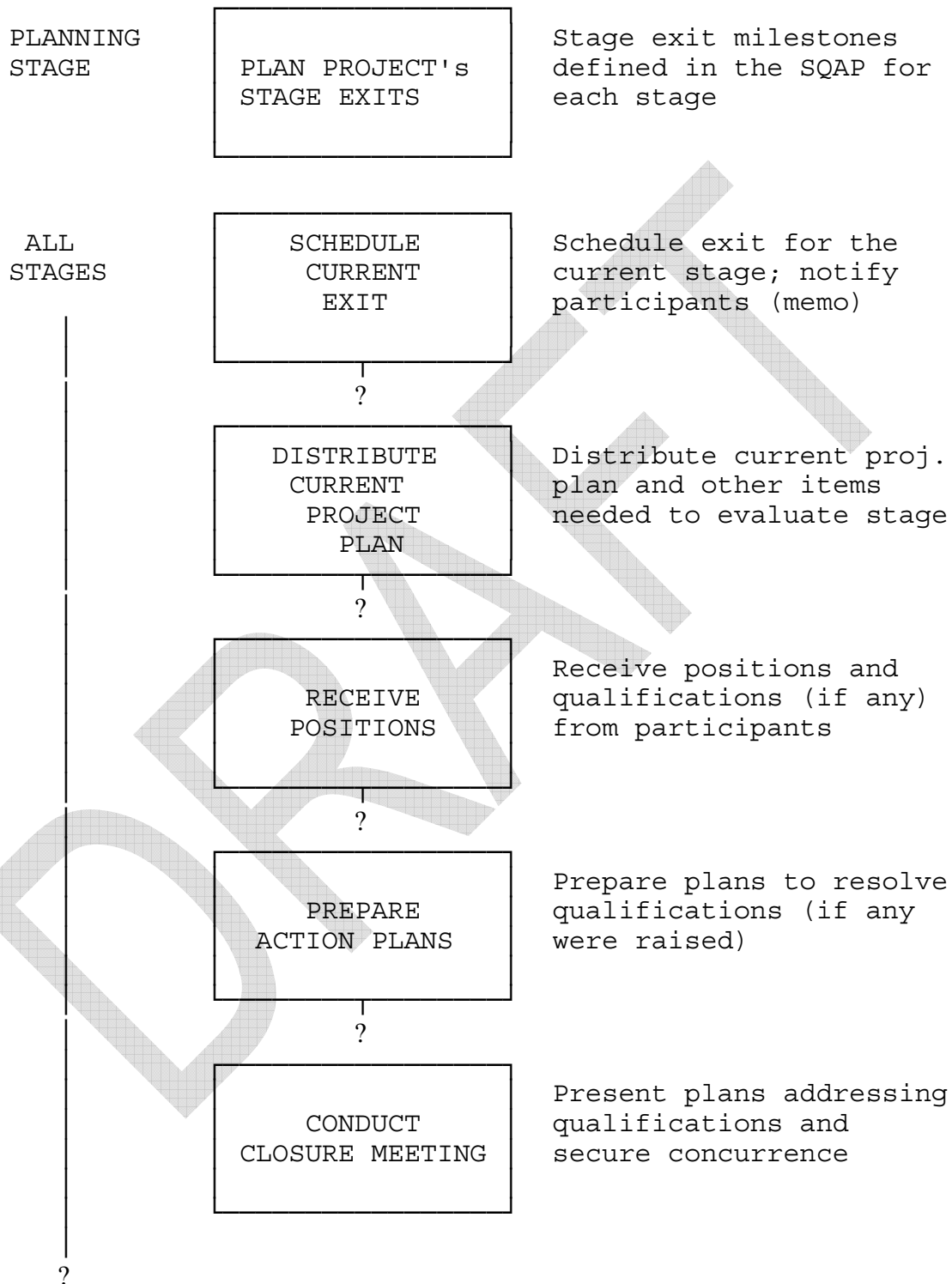
With any software development/integration project, lifecycle stages may overlap as activities of the new stage are beginning and activities of the previous stage are completing.

The Stage Exit process begins with a notification to the extended development team that a stage exit has been scheduled. The process ends with the 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)
- Current project plan
- Issues to be addressed (generic)
- Concurrence/qualifications from the approvers
- Issues that remain open from the last In-Stage Assessment

The following diagram depicts the Stage Exit process flow:



Each approver will respond to the SJ-RT Project Manager using the Stage Exit Position Response form shown on the next page.

Stage Exit Position Response Form

Project name: Smith Jones Rapid Transit (SJ-RT)

Project stage:

Return form to: A. Michelangelo, Project Manager

Return by:

Position:

G Concur.

Proceed with the project according to the current Project Plan.

G Concur with qualifications.

Issue(s) exist. The project can proceed according to the current Project Plan if there is an acceptable action plan for each issue by the stage exit meeting.

G Non-concur.

Significant issue(s) exist. The project should not proceed to the next stage until the issue(s) is resolved.

Qualifications (issues):

Approver: _____
(please print)

Signed: _____ Date _____

3.4 Peer Reviews

A minimum of one Structured Walkthrough (or peer review) will be performed on each lifecycle deliverable.

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4. Verification and Validation of Requirements

Verifying SJ-RT requirements at the end of the Preparation stage will establish the proper basis for initiating the Software Design stage activities. The Functional Requirements Document (FRD) must contain, at a minimum, documentation on the essential requirements (functions, performance, design constraints, and attributes) of the software and its external interfaces.

The following IEEE definitions apply in this SQAP:

verification: The process of determining whether or not the products of a given stage of the software development cycle fulfill the requirements established during the previous stage.

validation: The process of evaluating software at the end of the software development process (acceptance testing activity in the Testing stage) to ensure compliance with software requirements.

The term **requirements** encompasses the areas of hardware, user interface, operator, software interface, functionality, performance, communications, security, access, and backup and recovery.

4.1 Verification

The following activities will be performed as part of requirements verification:

- Produce a traceability matrix tracing all FRD requirements back to system objectives in the SJ-RT Objectives Statement and forward to Software Design elements.
- Evaluate FRD requirements and relationships for correctness, consistency, completeness, accuracy, readability and testability.
- Assess how well the FRD satisfies the SJ-RT system objectives.
- Assess the criticality of requirements to identify key performance or critical areas of software.

4.2 Validation

The following activities will be performed as part of requirements validation:

- Plan acceptance testing, including criteria for:
 - compliance with all requirements
 - adequacy of user documentation
 - performance at boundaries and under stress conditions.
- Plan documentation of test tasks and results.
- Execute the Acceptance Test Plan.
- Document acceptance test results.

5. SQA Milestones

Based on the draft SJ-RT Master Schedule as of February 1997, following are the SJ-RT project activities and work products that the QA consultant will review and audit:

Stage	In-Stage Assess. Date	Stage Exit Date	Deliverable (date delivered)	Work Product (date completed)	QA Activity
Planning	03/03/97	03/07/97	Project Plan (02/24/97)	Project Schedule (02/24/97)	ISA Process - (review processes & audit contents)
Preparation	04/08/97	04/08/97	Functional Requirements Document Acquisition Plan Installation Plan	Revised Project Plan	ISA Process - (review processes & audit contents)
Software Design	05/29/97	06/05/97	Functional Design Document Security Plans Training Plan Sys. Test Plan Acceptance Plan Conf. Mgmt. Pln. Conversion Plan	Traceability matrix Revised Project Plan	ISA Process - (review processes & audit contents) Trace design components to requirements Trace requirements to design components
Programming and Integration	09/25/97	09/30/97	Site Installation Plan System documentation (draft)	Revised Project Plan	ISA Process - (review processes & audit contents)
System Testing and Acceptance	12/04/97	12/22/97	Test results System documentation (final) Operational system	Revised Project Plan	ISA Process - (review processes & audit contents)