STANDARD SYSTEMS CENTER HANDBOOK 700-10

SOFTWARE ENGINEERING PROCESS (SEP)

VERSION 2.0
16 March 1994
(Supersedes Version 1.6)

SEP Feedback Form

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Chapter **Page**

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Preface

Introduction

This document presents the Standard Systems Center (SSC) Software Engineering Process (SEP). The SEP implements the DoD 5000 series and brings together all government documents as specified in Chapter 7 to form a total framework for all software development efforts.

Applicability

All software development and maintenance efforts regardless of size, nature, or origin (government or contractor developed) must follow this document.

Tailorability

The SEP may be tailored due to differences in requirements, resources, schedules, size, etc. This tailorability allows the project/program managers to select steps from this approved process to accomplish their task. After the tailored process has been approved, no deviation will be allowed, unless approved by the Executive Director.

Background

The SSC SEP is a product of the SSC's on-going Software Process Improvement (SPI) efforts. The SEP was created to address the need for a defined, measured, repeatable way of managing and developing software products. It is not intended as a solution, but rather a baseline from which to continuously refine and improve the process.

Audience

The SSC SEP has four primary audiences:

Audience	Use
SSC Leadership and Program/Project Managers	Reviews, approves, and implements the SSC SEP.
Team Leaders, Functional Analysts, Programmers, Functional Users, and Support Personnel	Carries out SEP tasks and procedures.
Software Process Assurance Group	Ensures compliance with the SSC SEP.
Software Engineering Process Group	Captures the current state of the SSC SEP and evaluates/updates recommended changes and improvements.

Access

The SEP is available in hardcopy and on the SSC LAN (see Appendix N for LAN access instructions). The LAN version also has numerous subdirectories that contain documents referenced in the SEP and other associated documents, i.e., the Capability Maturity Model (CMM), sample SDPs, and other SSC "best" documents. Since connectivity of the SEP on the LAN varies, contact a SSC/QI representative at 416-5882 for any assistance that may be needed.

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1.0

Introduction

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Chapter 1

STANDARD SYSTEMS CENTER (SSC) SOFTWARE ENGINEERING PROCESS (SEP) Introduction

Introduction

A common approach to developing software products at the SSC has been defined and baselined in the form of this document, *The SSC Software Engineering Process (SEP).*

The SEP is approved by, and implemented at the direction of the SSC Executive Director.

Source

This document is built upon the foundation of existing efforts within government and industry. Considerable time was applied at reviewing and extracting applicable information in ensuring this document captures the "best of the best." The government manuals, regulations, standards, and instructions, listed in Chapter 7, served as the cornerstone in developing this document. The creation of this document is the result of a cooperative team of experts from across the SSC.

The IEEE Standard 1074, *Developing Software Life Cycle Processes*, along with the *Capability Maturity Model (CMM) for Software* and the *Key Practices of the Capability Maturity Model* which were developed by the Software Engineering Institute, Carnegie Mellon University, were also used in developing this document.

Office of Primary Responsibility (OPR)

You Own It

As in any good organization focused on Total Quality Leadership (TQL), the standards and procedures used to provide a product or service belong to people who use them.

You Improve It

It is expected that by collecting and analyzing the basic measurements associated with this process, improvements will be made. More importantly, those who use this process will undoubtedly identify and suggest ways to improve it.

The SSC Software Engineering Process Group (SEPG) is the OPR for this document. Submit the SEP Feedback Form, in front of this document, for all recommendations/changes to SSC/QID.

continued on next page...

SSC SEP Introduction

Standardization and Tailorability

Two opposing forces are at play in the software development environment; **Standardization** and **Tailorability**.

Standards are necessary for obvious reasons, (i.e. accountability, traceability, and manageability). However, the need to tailor is due to differences in requirements, resources, schedules, size, etc.

Finding a compromise between standardization and tailorability has always been a major problem.

"Some things will always be..."

Certain "truths" about software development have evolved over the years and will always apply, regardless of languages, platforms, tools, or lifecycles.

Requirements must be evaluated, documented, and approved. Resources must be allocated. Work must be planned and estimated. Work must be tracked and compared with plans and estimates. Software must be tested. Artifacts associated with the development should be placed under configuration management. And there are others.

"But my project is different..."

Another truth about software development is that all efforts are unique in certain ways.

Problems are of different levels of complexity or abstraction. Some are more critical than others. Different levels of resources are applied to each problem. Changes in tools and technologies create unique opportunities.

"One does not exclude the other..."

The problem with many previous attempts to write standards for software development was this: *they tried to prescribe what to do as well as imply or direct the order in which to do them.*

The key to standardization and tailorability is prescribing what activities need to be accomplished (and where applicable, the order) but allowing flexibility to the sequence.

The SEP Tailoring Worksheet, contained in Appendix D, page D-1, will allow program/projects the flexibility to select steps from the approved process to accomplish their task. After the tailored process has been approved, no deviation will be allowed, unless approved by the Executive Director.

continued on next page...

SSC SEP Introduction

Software Process Assurance

A new concept (for the SSC) introduced in this process, and critical to its success, is Software Process Assurance (SPA).

It differs from Software Quality Assurance (SQA) in that, SPA focuses on the processes used to create a product, while, SQA focuses more on the product itself.

Quality Truths

One of the universally accepted tenets of Total Quality is that: *the quality of a product or service is directly related to the quality of the process that produced it*. Just as one would inspect a product for deviation from standards, so must one inspect the process for deviation from its standards.

Continuous process improvement dictates that:

1) A baseline process must be defined
2) **That process *must* be followed**
3) The results of the process can then be measured
4) Improvements can then be designed and implemented based on that quantifiable measurement.

The SPA ensures the process is followed. The SPA is a planned and systematic means for assuring management that documented plans, directives, methods, procedures, and standards are being applied effectively during the software engineering process. The SPA provides management with appropriate visibility into the process being used by the software project. Measured outputs from a process are *meaningless* if there is no degree of confidence as to the state of the process.

Why Processes Fail

The numerous standards that have come and gone failed for three main reasons:

1) The standard is unusable (unreadable).
2) The standard is inflexible (untailorable).
3) **The standard is never enforced with certainty.**

Despite the noblest of intentions, pressures (both external and internal to the organization) tend to throw standards out the window. People do what is *inspected* not *expected.*

continued on next page....

SSC SEP Introduction

Approach

Standards and flexibility are also addressed in the approach taken to defining the SEP. At the SSC, the process for developing government or contractor-developed software products, (or maintaining and modifying existing products), is seen as having three distinct parts or *phases:*

- The *Pre-development Phase* encompasses the needs analysis and planning activities. It is a goal that this phase be executed in a uniform manner across the SSC.

- The *Development Phase* encompasses the functional analysis, allocation, design, code, and unit test activities. This phase allows for the most flexibility from project to project.

- The *Post-Development Phase* encompasses the qualification testing and release activities. Again, the goal for this phase is a high degree of standardization across the SSC.

About This Format

In order to correct one common flaw among all previous versions of a software development process (readability), the SSC SEP uses Information Mapping. This is a methodology that utilizes research principles about how people process information.

Information Mapping is a registered service mark of Information Mapping, Inc.

Remaining Chapters

The rest of this document is organized as follows:

Chapter	Title	Page
2	Components of the SSC Software Engineering Process	2-1
3	SSC Directives for Software Development	3-1
4	The Pre-Development Phase	4-1
5	The Development Phase	5-1
6	The Post-Development Phase	6-1
7	Acronyms, Definition of Terms, and References	7-1
8	Appendices	8-1

2.0

Components of the Software Engineering Process

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Chapter 2

Components of the Standard Systems Center (SSC) Software Engineering Process (SEP)

Overview

Introduction

The SEP consists of multiple components. In order to aid in the understanding and discussion of the SEP, a framework must be established.

In This Chapter

This chapter covers the following topics:

Topic	Section
Components of the Software Engineering Process (SEP)	2.1
Phases of the SEP	2.2
Processes	2.3
The Four Stages	2.4
Stage Attributes	2.5
Activities	2.6
Tasks and Procedures	2.7

SEP Layout

The overall layout of the SEP document is displayed in Atch 2.1-1, page 2-xxxv, for your convenience. This depicts the processes, activities, reviews, and baselines for the software engineering process.

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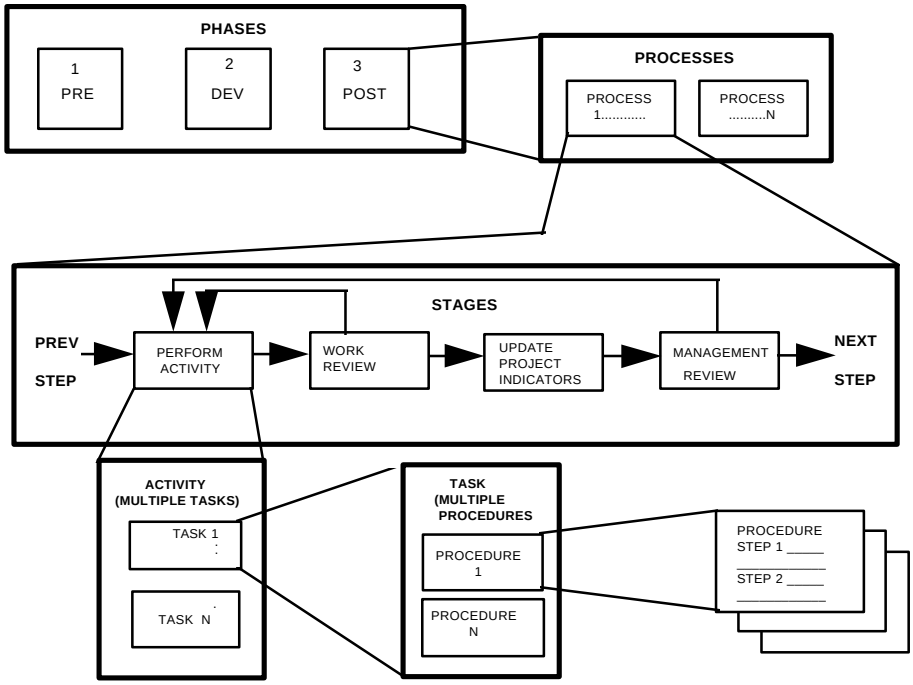
2.1 The Components of the Software Engineering Process (SEP)

Introduction

The SEP encompasses all work performed and all artifacts produced in creating a software product.

Context

This diagram illustrates the various components and their inter-relationships in the SEP.



SEP Components

The SEP components are:

Components...	Which consist of...
Phases	3 Phases (Pre-development, Development, and Post-Development)
Processes	10 Processes
Stages	4 Stages (Perform Activity, Work Review, Update Project Indicators, and Management Review)
Activities	One or more Tasks
Tasks	One or more Procedures
Procedures	Step by step instructions

Support Activities

In addition to the components, there are support activities that span the entire SEP:

- Project Tracking and Oversight
- Configuration Management
- Quality Assurance (*both process (SPA) and product assurance (SQA*))

2.2 Phases of the SEP

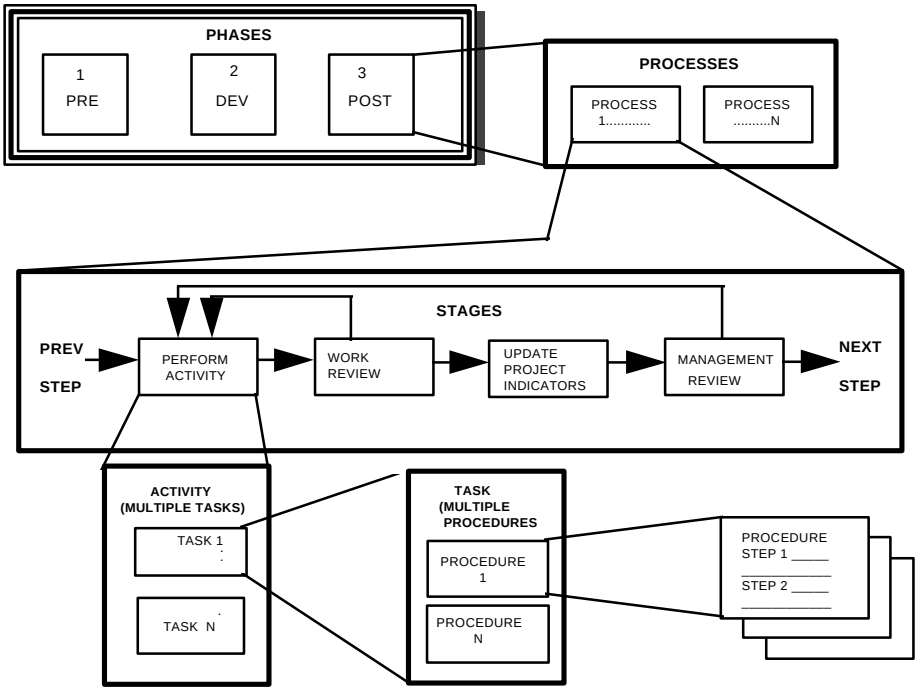
Introduction

Phases are the highest logical divisions of work in developing a software product. Each Phase has its own entry and exit criteria, as well as mechanisms and constraints for accomplishing the work.

Phases represent the highest level of process abstraction in the SEP.

Context

This diagram illustrates the relationship of phases to the overall SEP.



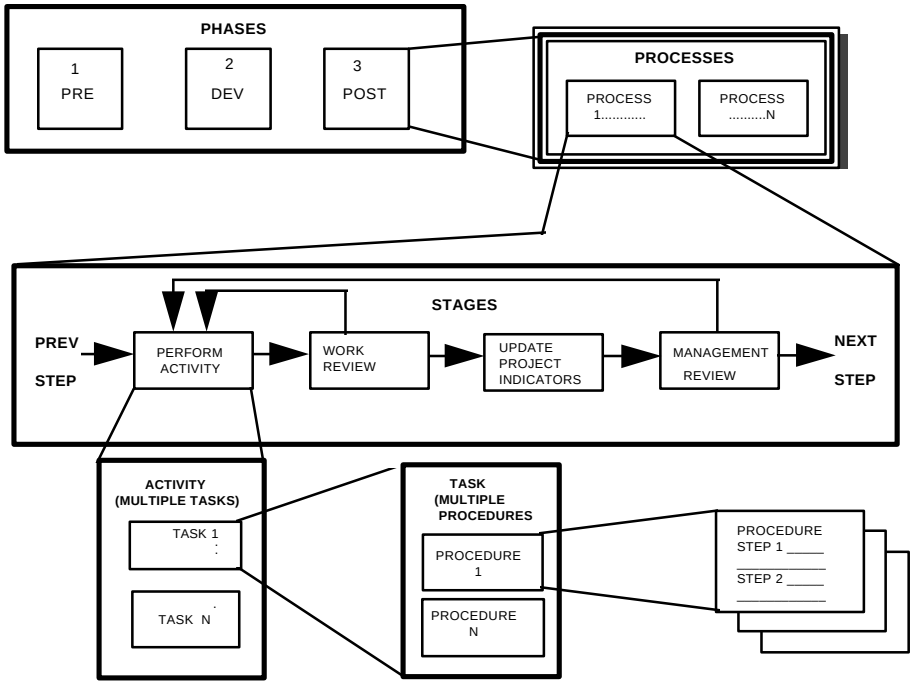
Three Phases The SEP consists of 3 Phases, each phase constitutes a chapter in this document.

Phases	Description
Pre-Development	All work accomplished and artifacts produced prior to the development of the software product. This includes needs analysis, documentation and approval, as well as, project planning. This phase is executed uniformly across the SSC.
Development	This phase encompasses the work performed and artifacts produced during the requirements analysis, design, coding, and testing of a software product. This phase allows the most flexibility from project to project based on development methodology.
Post-Development	This phase encompasses qualification testing and release activities. As with the Pre-Development phase, this phase is also executed uniformly across the SSC.

2.3 Processes

Introduction Processes are the next level of abstraction in the SEP. There are 10 Processes within the 3 phases of the SEP.

Context This diagram illustrates the relationship of Processes to Phases within the SEP.



Processes There are ten specific processes within the 3 phases of the SEP:

Processes	Performed during:
• Needs Analysis • Project Planning	Pre-Development
• System Requirements/Design • Software Requirements • Software Design • Code and Test	Development

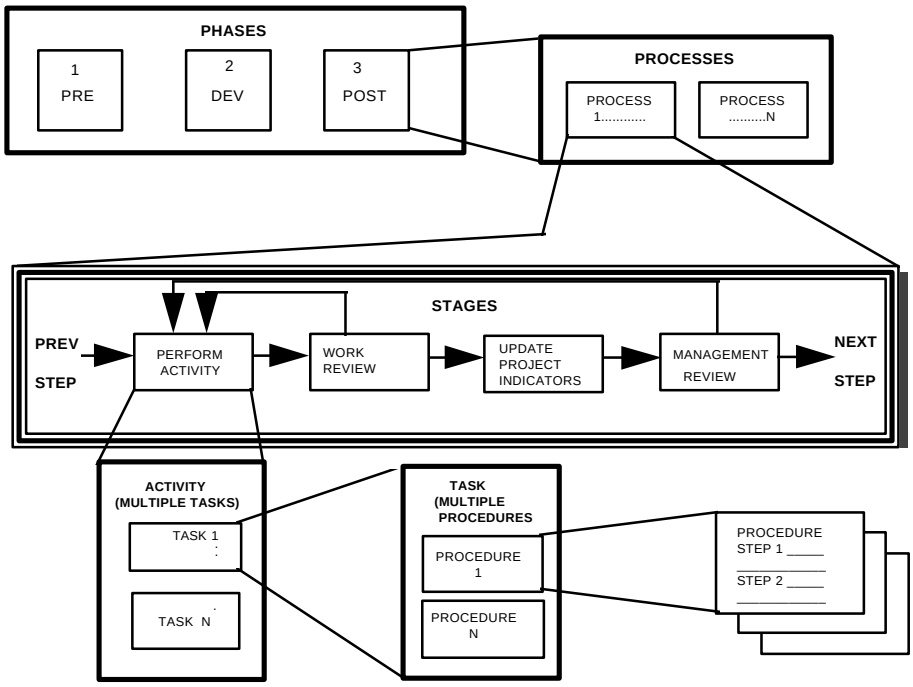
Processes (Cont'd)

Processes	Performed during:
• Qualification Test & Evaluation I (QT&EI) • Qualification Test & Evaluation II (QT&E II) • Qualification Operation Test & Evaluation (QOT&E) • Product Release	Post-Development

2.4 The Four Stages

Introduction Stages are logical groupings of work activities within a process.

Context This diagram illustrates the relationship of Stages to Processes within the SEP:



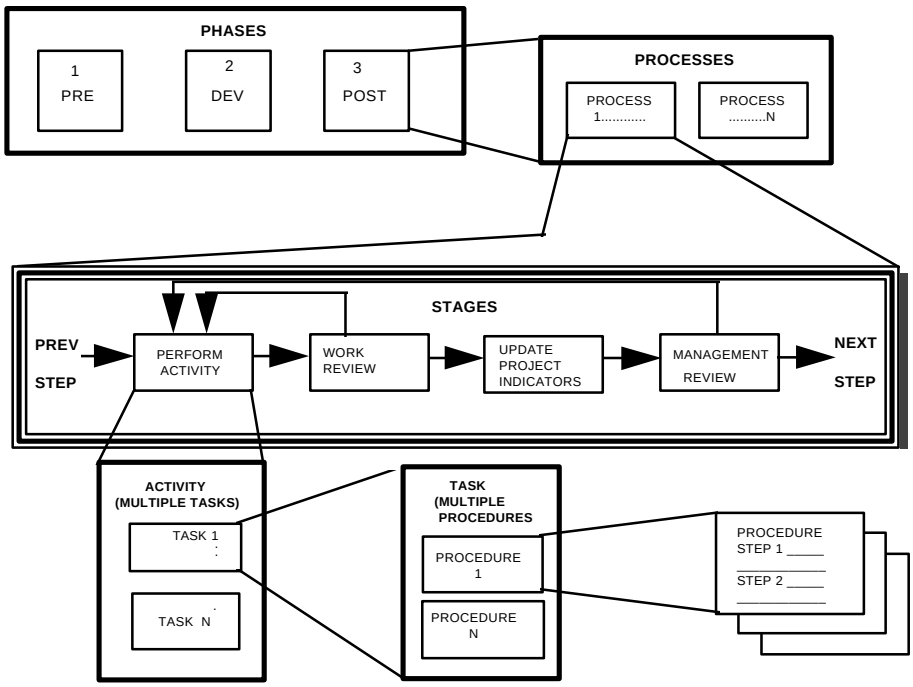
Four Stages Each process in the SEP consists of 4 stages:

Stage	Description
Perform Activity	Activities that produce a software artifact are performed during this stage.
Work Review	A Work Review is conducted after every Perform Activity stage to ensure technical completeness and conformance to SSC standards and policy. An independent body of experts review the artifacts and recommend continuation or rework.
Update Project Indicators	When the software artifacts have been technically approved, it is necessary to update the project indicators based on the steps just completed. Indicators are compared to actuals and used to project resources for the next process.
Management Review	Management is made aware of the projects status and projected costs. Management then decides whether to continue the project, re-accomplish aspects of the current process, or cancel the project.

2.5 Stage Attributes

Introduction 1. This section describes the attributes of a stage.

Context This diagram illustrates the relationship of attributes to the stages within the SEP:



Attributes of a Stage The following table lists the attributes associated with a stage. These attributes are used/defined consistently throughout this document.

Stage Attribute	Description
Purpose	Defines the purpose and objectives of the stage.
Diagram	Illustrates the relationship of the stage to the current process.
Entry Criteria	Lists the criteria that must be complete before the stage can be executed.
Input Summary	Lists the documents and other inputs required for successful completion of the stage.
Activities	Lists the activities to be performed.
Roles and Responsibilities	Lists the roles and responsibilities of the organizational entities required for successful completion of the stage.

Stage Attribute	Description
Product Summary	Lists the products produced at the completion of the stage.
Measurements	Minimum set of measurements to collect in order to evaluate the effectiveness of the activities performed.
Exit Criteria	Lists the criteria that must be satisfied to complete the stage.

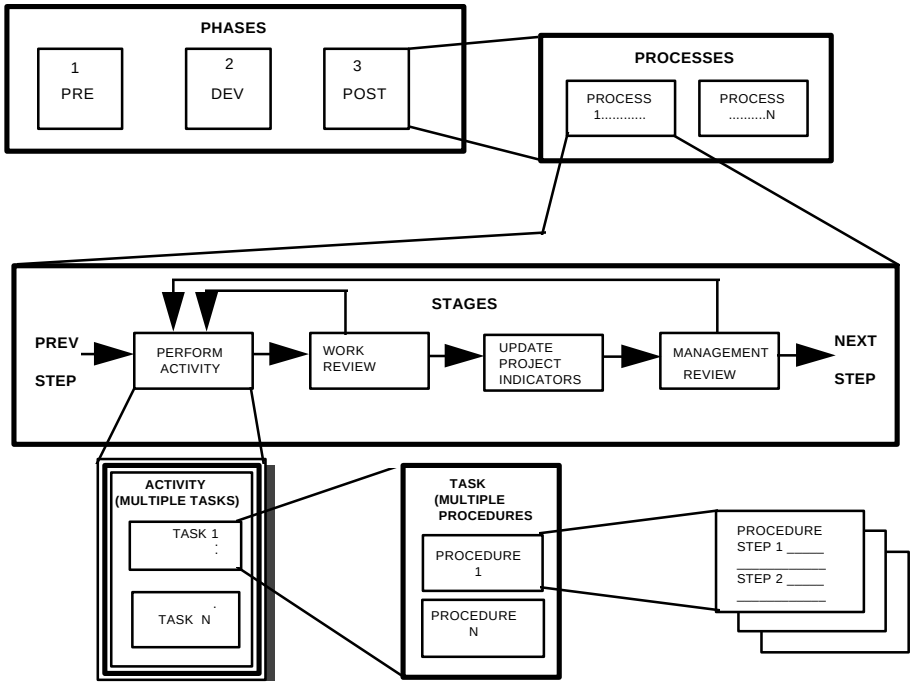
2.6 Activities

Introduction

Activities are logical groupings of work within a process. Activities are the highest level of measurable work within the SEP. Activities are accomplished using a disciplined engineering approach called the "Activity Cycle."

Context

This diagram illustrates the relationship of the Activities to the Stages within the SEP.



Activities

The following table lists examples of activities in the *Project Planning* process

Stage	Activities
Perform Activity	Develop Project Plan Develop Configuration Management Plan Develop Quality Assurance Plan

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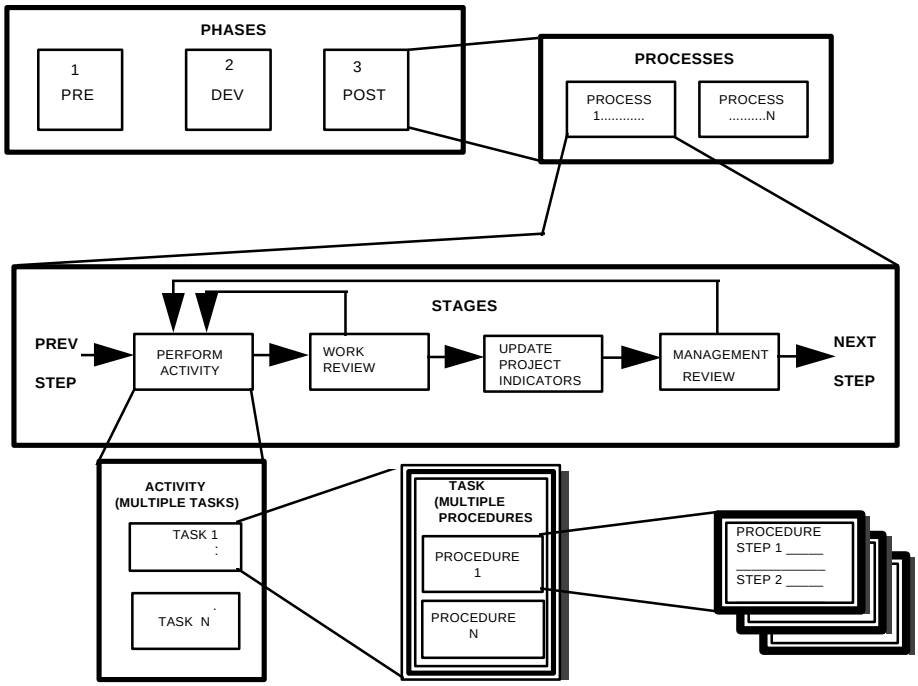
2.7 Tasks and Procedures

Introduction

Tasks and Procedures are step-by-step instructions for performing units of work. They are the lowest level of abstraction in the SEP model. Activities are accomplished by performing their associated Tasks and/or Procedures. The first four levels of the SEP framework (Phases, Processes, Stages, and Activities) are abstractions used by leadership and project managers to plan and track development. They are the "*what to do's*." Tasks and Procedures, on the other hand, are used by project personnel to accomplish the development. They are the "*how to do's*."

Context

This diagram illustrates the relationship of the Tasks and Procedures to the Activities within the SEP.



Tasks

Tasks are units of work within an Activity. The following table is an example of an activity within the *Project Planning* process, Perform Activity stage.

Activity	Associated Tasks
Perform Project Planning Activities	Develop Estimates Develop Detailed Schedule Develop High-Level Scheduling

Procedures

A Task consists of one or more Procedures. The following table is an example of the Task, *Develop Estimates*, which has the following **Procedure** associated with it:

Associated Task	See Procedures
Develop Estimates	Atch 4.1.3-1

Attachments

Atch 2.1-1
SEP Layout

(This attachment is located on the LAN under file SEP.ppt. You may print a hard copy.)

Atch 2.1-1, Continued
SEP Layout

Atch 2.1-1, Continued
SEP Layout

Atch 2.1-1, Continued
SEP Layout

Atch 2.1-1, Continued
SEP Layout

Atch 2.1-1, Continued
SEP Layout

3.0

SSC Directives

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Chapter 3

SSC Directives for Software Development

Overview

Introduction

This chapter spells out the SSC directives for developing software products. These directives lay the foundation for all processes, activities, tasks, and procedures used to develop software products at the SSC.

Scope

These directives and the associated procedures apply to all software development SSC-wide. This document defines standard software development and maintenance activities which are tailored by each project to fit its unique characteristics.

Applicability

The directives contained herein apply to all software development and maintenance efforts regardless of size, nature, or origin (government or contractor development).

OPR

The Office of Primary Responsibility (OPR) is responsible for updating the directives.

In this Chapter

The directives in this chapter are organized as follows:

Directives	Section	OPR
Program/Project Management Approval Authority	3.1	RM
Software Process Assurance	3.2	QIA
Reviews	3.3	SSP
Requirements Management	3.4	RMB
Software Project Planning	3.5	SSP
Software Project Tracking	3.6	SSP
Software Configuration Management	3.7	SSP
Software Design Management	3.8	SSPS
Software Code Management	3.9	SSPS
Software Testing/Product Assurance	3.10	SSQ

continued on next page...

In this Chapter (Cont'd)

Directives	Section	OPR
Software Reuse	3.11	SSBT
Data Standardization	3.12	SSPS
Software Contract Management	3.13	PK
Metrics Management	3.14	QIA
Development Security	3.15	RMMS
Rapid Prototyping/Simulation	3.16	QID

3.1 SSC Program/Project Management Approval Authority Directive

Definitions

Provides the means for categorizing software development requirements within the SSC to determine the approval authority and reviewing official.

There are three management categories as depicted in SSCR 700-3:

- Management Category I
- Management Category II
- Management Category III

Note: SSCR 700-3 was in draft at the time of this printing.

Management Category Goal

The Management Category goal is to:

- Provide management with the approval authority and review official.

OPR

This directive will be maintained by SSC/RM.

Management Directive

SSC directive for management categories are as follows:

Description
The approval authority of the SSC Executive Director is delegated to the SSC organizational elements by way of management categories.
All requirements must be assigned to one of three management categories as depicted in SSCR 700-3.
All Communications-Computer Systems Requirements Documents (CSRDs) generated within, or received from outside the SSC must be processed through the Requirements Processing Working Group (RPWG) and the Communications-Computer Systems Requirement Board (CSRB), as outlined in Chapter 4 of this document.
The SSC Executive Director may upgrade or downgrade a management category of a requirement.

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3.2 SSC Software Process Assurance (SPA) Directive

Definition

A planned and systematic means for assuring management that documented plans, directives, methods, procedures, and standards are being applied effectively during the software engineering process.

SPA provides management with appropriate visibility into the process being used by the software project and of the products being built. This involves reviewing and auditing the software activities and products to verify they comply with this document. Results of these reviews and inspections are provided to the project manager and other appropriate management.

SPA Directive Goals

The SPA goals are to:

- Ensure all software process activities are planned in accordance with this document.
- Verify adherence of software products and activities to the applicable standards, procedures, and requirements.
- Ensure that affected groups and individuals are informed of software process assurance activities and results.
- Ensure non-compliance issues that cannot be resolved within the software project are addressed and resolved by applicable approval authority.

OPR

This directive will be maintained by SSC/QIA.

SPA Directive

The following SSC SPA directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available to perform the Software Engineering Process (SEP) activities.
All software activities and products must adhere to this document.
All projects must work with the SPA group, IAW the SPA plan, as outlined in Appendix I.
SPA plans are placed under configuration control.
All projects' software development plans must be reviewed by the SPA group.

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SPA Directive (Cont'd)

Description
All project personnel understand and receive orientation on the role, responsibility, authority, and value of SPA plan and this document.
Software Process Assurance must be practiced on all software projects.

SPA Group Directive

The following SSC SPA directive applies to the SPA group:

Description
The SPA group must have a reporting channel to senior management, that is independent to the program/project and other support organizations.
Senior Management will periodically review the SPA activities and results.

3.3 Reviews Directive

Definitions

Reviews provide the means for removing defects from the software work products early and efficiently; provide critical technical evaluations; and provide management approval and oversight of scheduled milestones throughout the SSC software engineering process.

There are four categories of reviews:

- Peer Review: A methodical examination of software products by the producers' peers to identify defects and areas where changes are needed.

- Work Review: An in-depth technical evaluation of a project's progress and supporting documentation. This review is conducted at the conclusion of the Perform Activity stage. Approval is required to proceed to the next step of the activity cycle.

- Management Review: A high-level overview presented to management depicting a project's status. This review is conducted at the conclusion of the Update Project Indicators stage. Approval is required to proceed to the next process.

- Program/Special Management Review: Periodic reviews of the status of all programs/projects within the SSC that enables the approval official or other management officials to review the status of a software production effort at any time in the production process.

Review Directive Goals

The Review goals are to:

- Remove defects from the software work products early and efficiently.

- Provide technical integrity and compliance.

- Provide management oversight and continuation approval.

OPR	This directive will be maintained by SSC/SSP.

Review Directive

The following SSC Review Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before review activities are initiated.
Reviews must be conducted in accordance with documented procedures, as outlined in Appendix A of this document.
Work and Management reviews must be held during every process as outlined in Appendix A of this document.
An SMR must be conducted 2 times a year unless otherwise requested by the command section.
All projects must identify a standard set of work products that will undergo peer review.
Reviews must be documented and spot audited on a regular basis by the Software Process Assurance (SPA) group.

3.4 SSC Requirements Management Directive

Definition

Requirements Management establishes a common understanding between the customer and the project office on what will be addressed in the development effort.

Requirement Management Directive Goals

The Requirements Management goals are to ensure:

- Software requirements are controlled to establish a baseline for software engineering and management use.
- Software plans, products, and activities are kept consistent with the software requirements.

OPR

This directive is maintained by SSC/RMB.

Requirement Management Directive

The following SSC Requirements Management directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before Requirements Management activities are initiated.
Software requirement baseline must be documented in accordance with approved procedures, as outlined in Chapter 5 of this document.
Software requirements must include, as a minimum: • agreements, conditions, and contractual terms • technical requirements • interface requirements • acceptance criteria
Software requirements must be documented in a format that is clearly stated, verifiable, traceable, testable, and reusable, as outlined in Chapter 5 of this document.
Software requirements must be reviewed and approved by the applicable approval authority, IAW SSCR 700-3, before they are incorporated into the software effort.
All software requirements must be reviewed and approved by the customer and applicable approval authority before they are incorporated into the allocated baseline.
All software requirements must be maintained under configuration control.

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Requirement Management Directive (Cont'd)

Description
Changes to software requirements must be performed in accordance with documented procedures as outlined in Chapter 5 of this document. Changes must be reflected in associated changes to the project's software plans, products, and activities. All changes must be reviewed, approved, and maintained under configuration control.
Software requirements must be tracked throughout the lifecycle of the software product.
The project manager must review the requirements status in conjunction with scheduled reviews. Minutes or other written proof of the review must be made.
Requirements Management activities must be reviewed by the applicable approval authority as part of the on-going Project Tracking and Oversight function. Concerns must be documented and resolved prior to the next review.

3.5 SSC Software Project Planning (SPP) Directive

Definition

The collection of plans that describe the activities to be performed for the software project. It governs the management of the activities performed by the development team for a software project.

SPP involves developing estimates for the work to be performed, establishing the necessary commitments, and defining a plan to perform the work.

SPP Directive Goals

The SPP goals are to:

- Document software estimates accomplished in accordance with SSC standard estimating procedures for use in planning and tracking the software project.
- Plan and document software project activities and commitments.
- Gain agreement from affected groups and individuals on their commitments related to the software project.

OPR

This directive is maintained by SSC/SSP.

SPP Directive

The following SSC Project Planning directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before software project planning activities are initiated.
All appropriate project plans must be reviewed and approved by the applicable approval authority, as outlined in Chapter 4 of this document.
All software must be developed, documented, and tracked according to an approved software development plan as outlined in Chapter 4 of this document.
Project commitments made to individuals and/or groups external to the SSC must be reviewed and approved by applicable approval authority.
All affected groups internal to the SSC must review and agree to the project's: • size, cost, and schedule estimates • project support • other commitments **Note**: Examples of affected groups include: Quality Assurance, SPA group, Configuration Management, RM, Database Managers, Training, etc.

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SPP Directive (Cont'd)

Description
All size, cost, schedule, and hardware estimates must be performed and documented in accordance with approved procedures as outlined in Chapter 4 of this document.
An approved and documented work breakdown structure (WBS) is required for all software development efforts.
Work must only be planned for approved and documented requirements.
All software development plans must contain as a minimum the following: • project's purpose, scope, goals, and objectives • selection of a software life cycle with predefined stages of manageable size • identification of the selected procedures, methods, and standards for developing and/or maintaining the software • identification of the software work products to be developed • size estimates of the software work products • estimates of the project's effort and cost • estimated use of critical computer resources • project schedule, including milestones and reviews • identification and assessment of the project's risks • plans for engineering facilities and tool support
The project plan detailed schedule must include tasks for site communication layouts, site preparation (electrical, cooling, and construction), and facility security certification/accreditation.
All appropriate project plans, as outlined in Chapter 4 of this document, must be maintained and managed under configuration control.

3.6 SSC Software Project Tracking (SPT) Directive

Definition

SPT provides management with visibility into the actual project's progress so effective actions can be taken when the project's performance deviates significantly from the software plans. This involves tracking and reviewing the project's accomplishments and results against documented estimates, commitments, and plans, and adjusting these plans based on actual accomplishments and results.

SPT Goals

The SPT goals are to:

- Track actual results and performance against the software plans.
- Manage corrective actions to closure when actual results and performance deviate significantly from the software plans.
- Gain agreement from affected groups and individuals on changes to software commitments.

OPR

This directive is maintained by SSC/SSP.

SPT Directive

The following SSC SPT directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available for tracking the project.
Commitments and changes to commitments made to affected individuals and/or groups external or internal to the SSC must be negotiated and approved by the applicable approval authority, in accordance with Chapter 4 procedures.
A project's size, cost, effort, and schedule must be tracked and corrective actions must be taken when necessary. All actions must be reflected in the project's plans, products, and activities. Actions must be reviewed, approved, and documented.
The program manager must conduct periodic internal reviews to track technical progress, plans, performance, and other issues against the software project plans. Results of the reviews must be documented as outlined in Chapter 4 of this document.
Work reviews must be conducted and documented to address the technical completeness of activities performed at selected milestones as outlined in Chapter 4 of this document.
Formal reviews must be conducted and documented to address the accomplishments and results of the software project at selected milestones.

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SPT Directive (Cont'd)

Description
Program/project managers (PMs) must maintain a work breakdown structure (WBS).
Program Managers and the SPA group must track program/projects to ensure milestones are met and measurements are developed and reported.
Program Managers and the SPA group must prepare program/project status reports to ensure senior management is aware of compliance/noncompliance issues.

3.7 SSC Software Configuration Management (SCM) Directive

Definitions

A discipline applying technical administrative direction and surveillance to:

- Identify and document the functional and physical characteristics of configuration items.
- Control changes to configuration items and their related documentation.
- Record and report information needed to manage configuration items effectively, including the status of proposed changes and implementation status of approved changes.
- Audit configuration items to verify conformance to specifications.

Formal SCM: Establishment of formal baselines and change control IAW MIL-STD-973.

Informal SCM: Administrative control of documents, other than baseline documents, that are produced during a system's life.

SCM Directive Goals

The SCM goals are to:

- Plan software configuration management activities.
- Ensure all configuration items are identified, controlled, and available.
- Control changes to identified configuration items.
- Inform affected groups and individuals of the status and content of the software baselines.

OPR

This directive is maintained by SSC/SSP.

SCM Directive The following SSC SCM Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before software configuration management activities are initiated.
Each Automated Data System (ADS) that manages acquisition or operational systems must have a configuration manager assigned either full or part time.
Configuration managers must develop and publish a configuration management plan. The plan must be developed as outlined in Appendix G, Sample-G1.
All projects must have a repository/library for storing key software components and documents.
Changes to configuration items/units must be initiated, reviewed, approved, and tracked.
SCM activities, contents of the baselines, and the status of configuration items/units must be documented, reviewed, and made available to affected groups and individuals.

3.8 SSC Software Design Management Directive

Definitions

Software Design Management involves the consistent act of performing a well-defined engineering process that translates requirements into design activities to produce correct and consistent products effectively and efficiently.

Design Directive Goals

The Software Design Management goals are to:

- Ensure design tasks are defined, integrated, and consistently performed to produce the software within a given methodology.
- Ensure software work products are kept consistent within a given methodology.

OPR

This directive is maintained by SSC/SSPS.

Design Directive

The following SSC Software Design Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before software design activities are initiated.
The software design must be produced, maintained, documented, and verified, according to the project's software development plan, to accommodate the software requirements and to form the framework for coding.
All software designs must be traceable and documented back to the software and functional requirements.
Internal software design reviews must be conducted and documented.
The software design must be technically consistent with the Technical Architecture Framework for Information Management (TAFIM), as outlined in Atch 3.8-1 (Page 3-57).
A mechanism must be used for ensuring traceability between the software detailed design and the code.

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3.9 SSC Software Code Management Directive

Definitions

Software Code Management involves the consistent act of performing a well-defined engineering process that translates the design into coding activities to produce correct and consistent products effectively and efficiently.

Code Directive Goals

The Software Code Management goals are to:

- Ensure coding tasks are defined, integrated, and consistently performed to produce the software within a given methodology.
- Ensure software work products are kept consistent within a given methodology.

OPR

This directive is maintained by SSC/SSPS.

Code Directive

The following SSC Software Code Management Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before software coding activities are initiated.
The software code must be developed, maintained, documented, and verified, according to the project's software development plan.
Each program must coordinate software code error prevention activities, i.e. peer reviews, structured walk-throughs, and software inspections.
The programming language guidance must be used for all new and upgraded software systems, as outlined in Atchs 3.9-1 (Page 3-59) and and 3.9-2 (Page 3-65).
A mechanism must be used for ensuring traceability between the software detailed design and the code.

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3.10 SSC Software Testing/Product Assurance Directive

Definition

A process by which the software, supporting documentation, and implementing directives are evaluated against the requirements and standards prescribed for those products.

Software Product Assurance Directive Goals

The Software Product Assurance goals are to ensure:

- The program manager has real time visibility during the development process to ensure that requirements are satisfied and that errors and discrepancies are detected and corrected as early as possible in the development of the product.
- All products are independently verified and validated before being released to our customers.

OPR

This directive is maintained by SSC/SSQ.

Software Product Assurance Directive

The following SSC Product Assurance directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before software product assurance activities are initiated.
Product Assurance is more than just testing and must encompass the entire software process.
Product evaluations conducted during all technical and peer reviews are the primary product assurance activities for ensuring product quality throughout project development. See SSC Reviews Directive (page 3-51).
Data on defects identified in product assurance activities must be collected, analyzed, and documented for use in management decisions and reviews.
All software and documentation released by SSC must be tested and evaluated as outlined in Chapters 5 and 6 of this document.
Complete product testing and evaluation must be done by the program manager before being released to independent Qualification Test and Evaluation (QT&E).
All products must go through independent QT&E before being released to our customers.

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Software Product Assurance Directive (Cont'd)

Description
All independent QT&E must be conducted, lead, or supervised by Software Quality Assurance (SSQ). For contracted efforts, program managers must negotiate a memorandum of agreement with Quality Assurance to ensure contracted QT&E milestones can be achieved.
All software testing must be traceable, repeatable, and documented.
Test plans, test procedures, and test cases must be placed under configuration control.
Changes to all software products, plans, process descriptions, and activities, as a result of product assurance activities, must be coordinated with the affected groups.
The applicable approval authority must approve or disapprove the release of all software and/or documentation. See SSC Program/Project Management Approval Authority Directive (page 3-47).

3.11 SSC Reuse Directive

Definitions

The practice of either using existing software assets (consumption) or developing new software assets in such a way that they can be utilized in parts of software systems, in addition to the one for which they were originally developed (production).

Reuse Directive Goals

The Reuse goals are to:

- Focus requirements analysis for common application services.
- Increase development productivity (organic and contract).
- Reduce software development/maintenance costs.
- Increase schedule achievability.
- Increase software quality.

OPR

This directive is maintained by SSC/SSBT.

Reuse Directive

The following SSC Reuse Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before reuse activities are initiated.
Reuse must be applied to all phases of the software development life cycle, which includes requirements, design, coding, testing, etc., as outlined in this document.
All software must be designed to make maximum use of existing reusable software.
All projects must develop Reusable Software Assets (RSAs) for subsequent reuse to the maximum feasible extent, recognizing all intellectual property rights.
All projects must check the Air Force Defense Software Repository System (AFDSRS) prior to initiating new requirements, designs, code, and test cases.
All reusable software products must be submitted to the AFDSRS after they are baselined.
All projects must use the guidelines as outlined in Appendix F, Reusable Software Asset Consumption/Production, in developing RSAs.

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Reuse Directive (Cont'd)

Description
Reuse development activities must be highlighted in the software development plan and reported during the reviews.
An abstract must be submitted for all planned RSAs to the AFDSRS as outlined in Appendix F, Reusable Software Consumption Assets/Production, of this document.

3.12 Data Standardization Directive

Definitions

The practice of building and managing reusable DoD standard data elements to greatly improve communications in support of the joint warfighting commanders through system interoperability and elimination of redundant data.

Data Standardization Goals

- Enhance communications through system interoperability.
- Promote data element reuse.
- Reduce software development time and maintenance costs by eliminating redundant data.
- Manage data as an enterprise-wide asset.

OPR

This directive is maintained by SSC/SSPS.

Data Standardization Directive

The following SSC Data Standardization Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before data standardization activities are initiated.
All systems developed or maintained at SSC must transition to the exclusive use of standard data elements.
DoD standard data elements must be used when available.
In the absence of a DoD standard element, an Air Force standard data element must be used.
Newly developed data elements must be submitted by the program/project office to SSC/SSMS for standardization. Data elements must be conditionally approved by SSC/SSMS prior to baseline of the software requirements specification.
Data elements must be developed in accordance with DoD 8320.1-M, 15 Dec 92 (Draft) and DoD 8320.1-M-1, January 1993.
All programs/projects must use the Defense Data Repository System (DDRS), administered by SSC/SSMS, who will assist in developing DoD 8320.1-M and DoD 8320.1-M-1 compliant data elements.

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3.13 SSC Software Contract Management Directive

Definitions

Software Contract Management involves selecting a software contractor, managing the contractor effectively, establishing commitments with the contractor, and tracking and reviewing the contractor's performance and results.

Software Contract Management Goals

- Select qualified software contractors.
- Maintain ongoing communications with contractor.
- Track contractor's actual results and performance against its commitments.

OPR

This directive is maintained by SSC/PK.

Software Contract Mgt Directive

The following SSC Contract Management Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before software contract management activities are initiated.
Work contracted out must be defined and planned in accordance with this document.
Contractual agreement between SSC and contractor must be used as the basis for managing the contract.
A documented contractor's software development plan, as outlined in Chapter 4 of this document, must be reviewed and approved by the applicable approval authority.
Program Managers and the SPA group must monitor the contractor's software quality assurance activities in accordance with this document.
Program Managers must conduct development testing as part of delivery of the contractor's software products.
Program Managers and the SPA group must track the status of activities for managing the software contract to ensure milestones are met and measurements are collected and reported.

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3.14 SSC Metrics Management Directive

Definitions

Measures collected over time, when analyzed, present meaningful information, from which decisions can be made.

Metrics Directive Goals

The Metrics goals are to:

- Perform evaluations - To determine if a process or product is meeting acceptance criteria.
- Control decisions - To plan limits and goals for a process or product and provide visibility to make decisions based on actual measurements versus the plan.
- Develop a database - To provide historical perspective and to provide the data for tools which monitor and make decisions based on measurements.

OPR

This directive is maintained by SSC/QIA.

Metrics Directive

The following SSC Metrics Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before measurements activities are initiated.
All projects must collect a minimum set of measurements as outlined in this document.

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3.15 SSC Development Security Directive

Definition

SSC's oversight of developments to provide for the management, protection, and distribution of sensitive information, both classified and unclassified. The directive requires interpretation of the regulatory (National, DoD, and AF) and operational requirements of the development system to achieve the most cost-effective solutions to confidentiality, availability, and integrity objectives of the customer. Security mechanisms/procedures are based on the needs of the Designated Approving Authority (DAA) and an initial risk assessment in consideration of system threats, clearances of the users (direct and indirect), data sensitivity, system criticality, and cost-benefit analysis. Security must be addressed as a documented operational requirement, identified at the pre-development phase and considered throughout the life cycle of the system to avoid the need for costly retrofits. This directive results from DoD Directive 5200.28, and AF Policy Directive (AFPD) 33-2.

Security Goals

The Security goals are to:

- Recognize the DAA as THE security customer and promotion of DAA participation throughout the development process.
- Identify, document, and address operational security requirements from the pre-development phase and continued throughout the systems life cycle. Operational security requirements are those resulting from or required by the intended use of the information processed, stored, or manipulated in the targeted system(s).
- Develop cost-effective systems which are certifiable and accreditable; and implement National, DoD, and AF security guidance such that risk is mitigated to an acceptable level by the DAA customer.
- Develop and maintain a security risk management process which addresses security throughout each products life cycle.
- Ensure security issues are adequately addressed in all appropriate development, documentation, program reviews, and status briefings.
- Ensure that necessary acquisition/development, testing and deliverable documents verify that security requirements have been satisfied and that the resulting system is certifiable and accreditable within given implementation guidelines.

OPR

This directive is maintained by SSC/RMMS.

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Security Directive

The following SSC Security directive applies SSC-wide:

Description
Identify the system DAA, to include resolution of multiple DAA responsibilities, and ensure DAA involvement beginning with the pre-development phase and continuing throughout the system's life cycle.
Adequate resources, budget, and training must be available before development security activities are initiated.
All software must be developed, documented, and tracked according to an approved software development plan as outlined in Chapter 4 of this document.
A project/program security manager must be appointed for each development effort, familiar with AFPD 33-2, and held accountable for development security issues and associated risk management. Systems destined to process classified data or those with significant security concerns require a full-time project/program security manager. Primary source of project/program security manager assistance is RMMS.
Commitments for support from external activities like the Air Force Information Warfare Center (AFIWC), Center for Information Systems Security (CISS), etc., must be coordinated with RMMS to eliminate costly duplication of effort and misunderstandings.
The program manager must perform a detailed system risk analysis, to include a Security Test and Evaluation (ST&E); develop thorough certification packages; and produce appropriate users security instructions (Trusted Facilities Manuals, Security Features User's Guide, etc.).
Program/Project Managers must be familiar with security responsibilities as outlined in AFPD 33-2 and AFSSI 5102.
Security risk management must be a continuous development cycle process to ensure mitigation of risk to an acceptable level by the DAA customer. A risk analysis process, to include ST&E, should occur throughout the project's life cycle. The risk analysis will identify satisfaction of security requirements, locate shortfalls, and determine residual risks (that portion of risk that remains after applying a set of security measures). Residual risks must be evaluated with the DAA to determine if they are acceptable or if additional countermeasures must be incorporated prior to program manager certification.
The program manager, in review with the DAA, must certify the extent to which the implemented security mechanisms satisfy the specified security requirements. Additionally, the development DAA must review the certification package to determine if the system's residual risks are acceptable within the guidelines of the security implementation package to warrant release, i.e. certify that the system is accreditable.

3.16 SSC Rapid Prototyping/Simulation Directive

Definition

Prototyping enables the developer to create a model of the software very quickly through customer and analyst improvement, interaction, experimentation, and demonstration. The developer and customer meet and define the overall objectives for the software, identify whatever requirements are known, and outline areas where further definition is needed. A basic model system is built from initial customer specifications. The customer then evaluates the demonstrated prototyped system. The prototyped system is modified accordingly and the customer again reviews for further refinement. A process of iteration occurs as the prototype is "refined" to satisfy the needs of the customer, while at the same time, it helps the developer better understand what needs to be done.

Prototyping is highly encouraged for applications that create dynamic visual displays, interact heavily with humans, involve simulation modeling, or require algorithm calculations. However, these application areas must be weighed against application complexity.

Simulation is a process used to ensure that the prototype is comprehensive, accurate, and functional. Simulation allows the developer to analyze the system's performance and gain an understanding of the prototype's behavior. Effective simulation requires an environment as close as possible to the target operational environment.

Rapid Prototyping/ Simulation Goals

- Produces a working model of the system very quickly through customer and analyst improvement, interaction, experimentation, and demonstration.
- Helps the developer better understand the customer requirements.
- Allows developer to analyze the system's performance and gain an understanding of the system's behavior.

OPR

This directive is maintained by SSC/QID.

Rapid Prototyping/ Simulation Directive

The following SSC Rapid Prototyping/Simulation Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before a prototype is designed.
A cost/benefit assessment must be developed in order to determine if the project is feasible for prototyping.
The use of prototyping must be addressed in the Software Development Plan (SDP) and become part of the milestone tracking.
The customer must be involved in the evaluation and refinement of the prototype.
The simulation environment must be as close as possible to the target operational environment.

(Pages 3-37 thru 3-55 reserved for future use)

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Attachments

Atch 3.8-1
The Technical Architecture Framework for Information Management (TAFIM)

(Contact SSC/QIDM, 6-4021, for a hard copy. This is a policy letter on Technical Architecture Framework for Information Management (TAFIM)).

Atch 3.9-1
Air Force Policy on Programming Languages

(This is a policy letter. Contact SSC/QIDM, 6-4021, for a hard copy)

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Atch 3.9-2
Interpretation of FY 91 DOD Appropriations Act

(This is a policy letter. Contact SSC/QIDM, 6-4021, for a hard copy)

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4.0

The Pre-Development Phase

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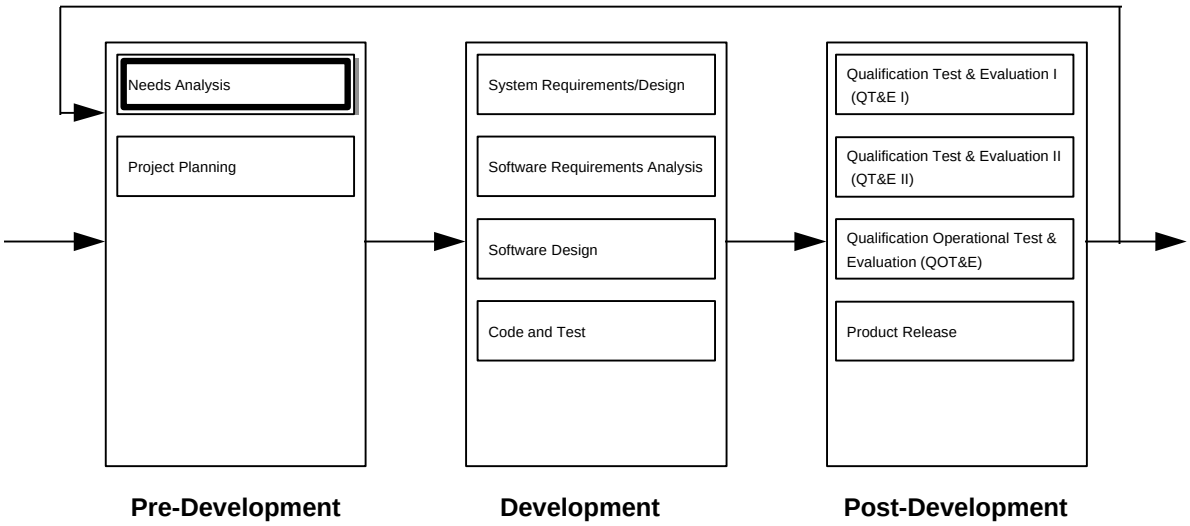
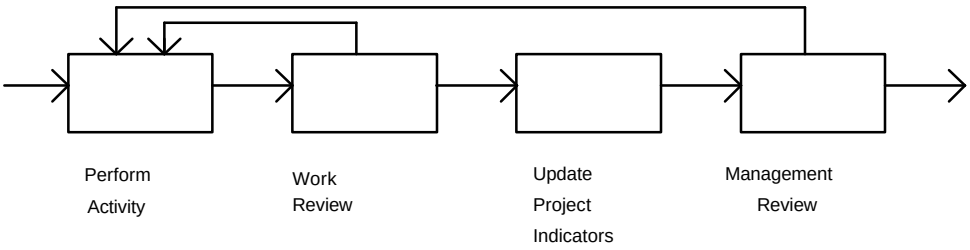
4.1 Needs Analysis: Overview

Definition: The Needs Analysis is the beginning of service to the customer. It is in this process that the customer's initial request(s) is documented and analyzed.

Where We Are This diagram illustrates where the Needs Analysis process fits in relation to the overall software engineering process.



Stages to Follow This diagram delineates the 4 stages required to complete the Needs Analysis process.



In This Section The specific Needs Analysis stages will be covered in the following sections.

Stages	Section
Perform Stage	4.1.1
Work Review	4.1.2
Update Project Indicators	4.1.3
Management Review	4.1.4

4.1.1 Needs Analysis: Perform Activity

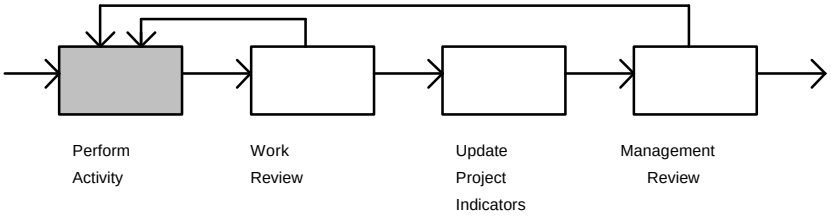
Purpose

The purpose of this step is to:

Establish pre-development processing procedures of Communication-Computer Systems Requirements (CCSR) within the Standard Systems Center.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	A business case analysis (i.e. IDEF0) has been completed by the user IAW DoD 8020.1-M (see Functional Process Improvement Strategies, Appendix J).
	A lead DAA for security has been established.
	An approved directive/requirement has been received.

Input Summary

The following input(s) are required for this stage.

Input	Description
Approved Directive/Documented Requirement	Must be in the form of a requirements document, e.g., CSRD, PMD, ORD, MNS, SOW, written suggestion etc.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Preparation	Process Communications-Computer System Requirements Document (CSRD) - Submit CSRD to SSC/RMBT - Assign a Resource Management Project Officer - Initialize an ADS Folder All requirements (including PMDs, MNSs, or ORDs) should be routed through the security office (SSC/RMMS).	SSCR 700-3 (Contact SSC/RM)
Conduct Program Start Review (PSR) (Strategic Roundtable)	Before starting the PSR: - Conduct Security Risk Assessment - Identify DAA - Discuss key issues with functional experts - Conduct a manpower assessment - Create a preliminary program schedule - Assess technology availability - Prepare a chart briefing using the ESC Training Guide charts as samples PSR is composed of SSC command staff, key functional staff directors, and the user, to include a DAA representive. - Program Manager briefs Roundtable members on requirements, technology assessment, technical alternatives, cost and schedule baseline, and initial strategy - Members advise on alternatives and issues based on their experience Obtain approval from SSC/ED/EV/EA to commit resources and proceed	DoDD 5200.28, Encl. 4 AFMC Pamplet 800-7 ESC Training Guide, 31 Jan 93 ESC/CC letters, 21 May 93, 23 Sep 92, 11 Jan 93 ESC/CV letter, 4 Feb 92
Prepare Initial Documents	Review Needs Analysis Tailoring Develop Program Management Plan (PMP) (To include applicable plans in the Project Planning Perform Activity of the SEP) - Establish a lead DAA if not previously done Prepare Operational Concept Document (OCD) if not previously done - To include system security policy (AFSSI 5001) Perform Software Reengineering Assessment Review directives in Chapter 3 of the SEP Identify lead base(s) for prototype and testing field (QT&E-II)	Appendix D AFR 800-2 Atch 4.1.1-1 (Page 4-113) MIL-HDBK-SRAH (Page 3-3)

continued on next page...

Activities (Cont'd)

Activity	Associated Tasks	See Procedures
Analysis	Conduct Needs Analysis - Analyze Communications-Computer System Requirements Document (CSRD) - Conduct the analysis: -- Technical Analysis and Cost Estimate (TACE) --- The Center technical director will review technical approach -- Operational security needs analysis	 SSCR 700-3 Contact SSC/RMMS
	-- Domain Analysis	Contact SSC/SSB
	-- Risk Analysis: --- Technical --- Programatic --- Supportability --- Cost and Schedule	SEI-93-TR-6
	-- Security Risk Analysis	AFPD 33-2 AFSSM 5018
	-- In-house/Contractor Analysis	SSCR 700-3
	-- Lease/Purchase Analysis	SSCR 700-3
	-- Level of Effort Baseline	DoDI 7920.4 SSCR 700-3
	-- POM Documentation	DoD-STD 7045.7
	-- Impact on Existing Workload	
	-- SSC support facilities (Hardware Operations, LANs, Test Release)	OP Operating Instructions

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support Needs Analysis activities.

Role	Responsibility
SSC/RMB	Provide traceability, visibility, and oversight of each Communication-Computer Systems Requirements (CCSR) throughout the Pre-Development Phase. With assistance from the SSC organization, ensure that each CCSR will have corporate agreement based upon applicable and consistent analysis.
Project Office	Responsible for coordinating with the user and support offices to ensure the requirement is complete, consistent, and accurate; and conducting the Program Start Review (Strategic Roundtable).
Support Offices	Provide support to the project offices as needed (see Appendix E).
Functional User	Provides requirement document.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed, IAW the SPA plan (see Appendix I).
Designated Approving Authority (DAA)	Ultimate security customer, responsible for determining acceptability of the developed system or network for operation at an acceptable level-of-risk.

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Program Management Plan (PMP)	An overall plan to establish program responsibilities.
Operational Concept Document (OCD)	A description of a proposed system in terms of the user needs it will fulfill, relationship to existing systems or procedures, and the ways it will be used.
Software Reengineering Assessment Documentation	All documents used to conduct the assessment, i.e. technical and economic analysis worksheets, and results from tools used in the analysis.
Technical Analysis and Cost Estimate (TACE)	A study to determine whether a requirement can be implemented with the current resources and technology.
Risk Analysis	An interactive process providing information on aspects of a system that need protecting, threats with an impact on the system, how well the system can be protected against those threats, how to improve system security and at what cost, and what residual risk would remain.
In-house/Contractor Analysis	A study to determine the feasibility of whether to develop software in-house or contract the requirement to outside sources.
Lease/Purchase Analysis	A study to determine the feasibility of lease versus purchase of equipment and/or software.
Level of Effort Baseline	The amount of program resources to be applied against the projected workload.
Program Objective Memorandum (POM) Documentation	Input required into the Biennial Planning, Programming, and Budget System cycle.
System Security Policy (Included in the OCD)	A set of laws, rules, and practices regulating how the using organization must manage, protect, and distribute the sensitive information process, stored, or manipulated by the target system. It interprets regulatory/operational requirements of the target system, states how that system will satisfy those requirements, and drives security feature selection/system design to meet confidentiality, availability, and integrity goals.
Domain Definition/Reuse Products	A "group" or "family" of related products that share a set of common capabilities and/or data.

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Number of hours expended in the analysis and tracking of the requirement.

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	The user need/requirement is reviewed, analyzed; PMP, OCD.
	Approval has been given to commit resources.
	The Designated Approval Authority (DAA) has been identified.
	Project and system security risks are identified, documented, and their impact assessed and results are ready to be presented to the user during Work Review.

4.1.2 Needs Analysis Work Review

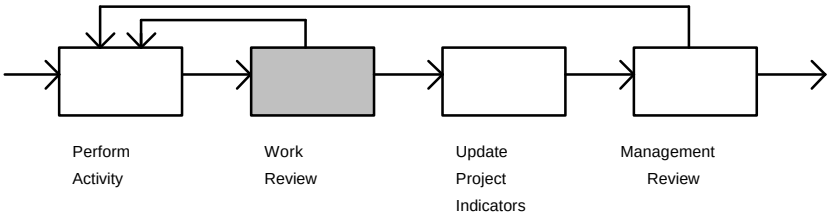
Purpose

The purpose of this review is to ensure that:

1. Appropriate support and functional organizations have been identified and given the opportunity to assess the technical content of the user's requirement.
2. User's requirements are documented in terms that are complete, consistent, unambiguous, feasible, and testable.
3. Technical risks are identified and documented.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The user need/requirement has been reviewed, analyzed, and all appropriate activities completed.
	Project risks have been identified, documented, and their impact assessed and results are presented to the user during Work Review.
	Funding and resources have been allocated.
	A Technical Analysis and Cost Estimate has been completed by the user IAW SSCR 700-3.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Directive/Documented Requirement	CSRD, PMD, ORD, MNS, SOW, written suggestion, etc.
Support Studies	All appropriate analysis conducted in the previous stage.
SPA Plan	Procedures and policy for software process adherence IAW the SPA plan.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedure
Review Preparation	Develop and Distribute review package	Appendix A (Page A-10)
Conduct Review	Review draft documents IAW the SSC Work Review Procedures. Materials to review include: - Requirements Documents -- Communications-Computer System Document (CSRD) -- Program Management Plan -- Operational Concept Document --- System Security Policy - Analyze Products -- Feasibility Study -- Technical Analysis and Cost Estimate -- Level of Effort Baseline -- Lease-Purchase Analysis -- Manpower Estimates -- Workload Impacts -- Security Risk Assessment - POM Support Documents - Project and Security Risk Analysis	Appendix A (Page A-14)
Review Follow-up	Track, address, and publish review issues Develop review minutes package Distribute review minutes package	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Presents review material
Functional OPR	Represents functional viewpoint
Review Panel	Review material
Support OCRs	Support review panel, as needed, on specific items
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced or reviewed in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Directive/Documented Requirement	CSRD, PMD, ORD, MNS, SOW, etc.
Studies	All appropriate analysis conducted on the requirement.
Technical Risks	Technical risks identified during the review including system security risks.
Review Defect Report	Defects identified during the review.
Review Action Items	Action Items taken during the review.
Review Minutes	Minutes of the review.
Review Recommendation	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Schedule	Hours expended categorized by: - project office preparation - review preparation - conduct of the review (length)
Requirement	Defects, errors, and/or omission found during the review.

Exit Criteria The requirements have been technically reviewed.

IF Review Panel ...	THEN ...
Approves Technical Content	Project proceeds to the Update Management Indicators stage.
Disapproves Technical Content	The requirements package is recycled to the Needs Analysis Perform stage for further refinement.

4.1.3 Needs Analysis: Update Project Indicators

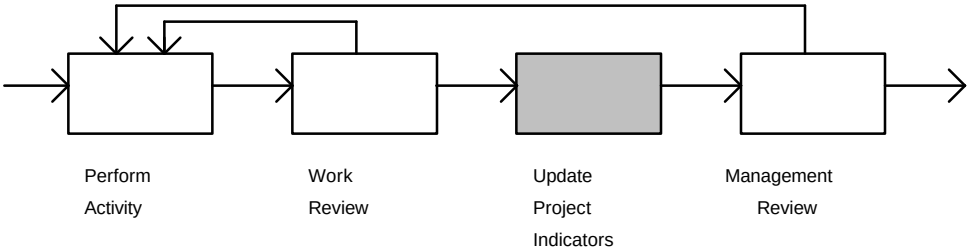
Purpose

The purpose of this process is to:

1. Update project management indicators (size, cost, and schedule)
2. Evaluate project risks and assess impact

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The user's requirement has been documented and reviewed.
	Funding and resources have been allocated.
	A Technical Analysis and Cost Estimate has been completed by the user IAW SSCR 700-3.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Directive/Documented Requirement	CSRD, PMD, ORD, MNS, SOW, etc.
Estimation Documentation	Size, cost, schedule and risk analysis.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedure
Estimate Size, Schedule, and Cost	Develop estimates All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures.	Atch 4.1.3-1 (Page 4-114)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Performs activities associated with this process.
Support Offices	Provide support as requested by the Project Office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan. (see Appendix I)

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Size Estimate	Initial Size Estimate
Cost Estimate	Initial Cost Estimate
Schedule Estimate	Initial Schedule Estimate
Manpower Requirements	Initial Manpower Requirements
Risk Analysis Report	Initial Risk Analysis Report

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Schedule	Number of man-hours expended Estimated schedules and elapsed time in weeks, months, and /or years
Size	Differences between initial and revised estimates Current estimate in Function Points

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Initial project size, cost, and schedule estimates have been developed.
	Project and system security risks have been evaluated and their impact assessed.

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4.1.4 Needs Analysis: Management Review (Initial Requirements Review) (Milestone 0, DoDD 5000.1)

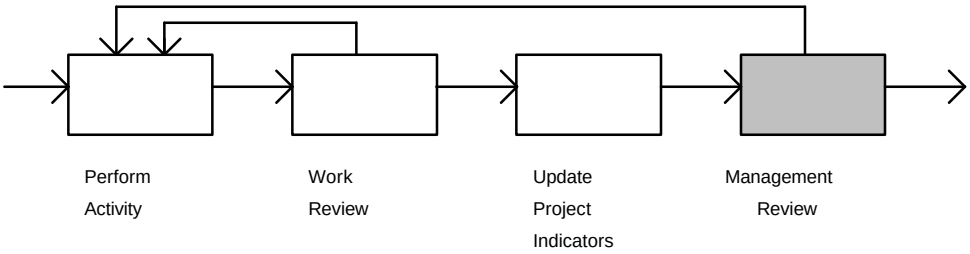
Purpose

The purpose of this review is to:

1. Provide management visibility
2. Approve/disapprove the requirements document (i.e. CSRD)
3. Review initial project size, cost, and schedule estimate
4. Review project risk areas
5. Approve/disapprove continuation of the project
6. Approve and allocate resources and funding to accomplish the next phase
7. Assign implementation to appropriate organization
8. Establish the Commitment Baseline

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The initial requirements have been defined, analyzed, reviewed, and documented.
	Initial project size, cost, and schedule estimates have been accomplished.
	Project and system security risks have been analyzed and their impact assessed.
	Funding and resources have been allocated.
	A Technical Analysis and Cost Estimate has been completed by the user IAW SSCR 700-3.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Requirements Package	CSRD, PMD, OCD, MNS, SOW, security requirement document, and support studies
Initial Project Estimates	Size, Cost, Schedule
Project Risks	Risk Management Plan
Work Review Minutes	Minutes from the Work Review.
Work Review Action Items	List of all Action Items from the Work Review.
Work Review Recommendation	Recommendation from the Work Review.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedure
Review Preparation	Develop and Distribute review package	Appendix A (Page A-10)
Conduct the Review	Review documents IAW the SSC Management Review Procedures. Material to review include: -- Overview of Project Management Plan -- Overview of Operational Concept Document (to include system security policy) -- Overview Work Review -- Program Funding Requirements -- Manpower Requirements; Direct, Support, Overhead, and Functional) Recommendations/Action Items - Status of effort expended to date - Resources Impact and Costs - Near-term Schedule Decisions to make: - Commit resources	Appendix A (Page A-14)
Review Follow-up	- Identify and document project risks Approval Authority to make following decisions: -- Determination of commitment baseline -- Project Continuation Approval or Disapproval	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Approval Authority)	Presides, Approves/Disapproves
Project Office	Presents review material to management
Review Panel	Assist Management in the decision process
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Approved Baseline	Requirement baseline (OCD, PMP).	F
Project Management Risks	Management risks identified during the review.	I
Review Defect Report	Defects identified during the review.	I
Review Action Items	Action Items taken during the review.	I
Review Minutes	Minutes of the review.	I
Approval Authority's Decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	I

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Schedule	Hours expended categorized by: - Project Office Preparation - Reviewer Preparation - Conduct of the Review
Requirement	Number of action items assigned by the Approval Authority

Exit Criteria

Management has committed to allocate resources to implement the requirement. Otherwise, the requirement is recycled through the Needs Analysis process or canceled.

IF Approval Authority ...	THEN ...
Approves Continuation	The project proceeds to the Project Planning phase.
Disapproves Continuation	The requirements package is recycled to the Needs Analysis Perform stage for further refinement.
Cancels Project	Refer to Cancellation process (see Appendix H).

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4.2 Project Planning: Overview

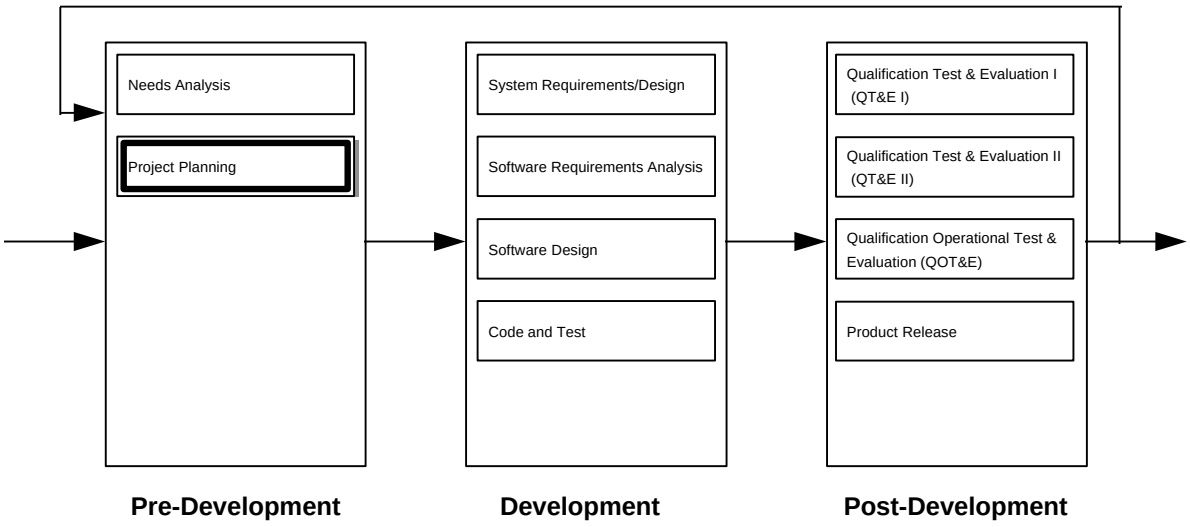
Purpose

"Planning is deciding in advance what to do, how to do it, when to do it, and who is to do it" [Koontz and O'Donnel, 1972].

Software project planning involves developing estimates for the work to be performed, establishing the necessary commitments, and defining the plan to perform the work. A plan is established to address the commitments to the customer according to resources, constraints, and capabilities of the project. The plan provides the basis for initiating the software effort and managing the progress of work.

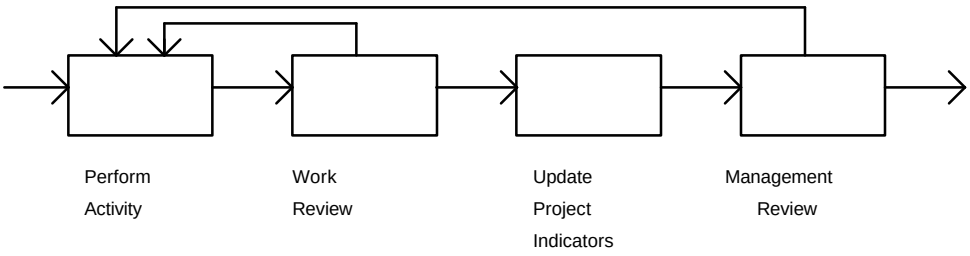
Where We Are

This diagram illustrates where the Project Planning process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete Project Planning process.



In This Section The specific Project Planning stages will be covered in the following sections.

Project Planning Stages	Section
Perform Activities	4.2.1
Work Review	4.2.2
Update Project Indicators	4.2.3
Management Review	4.2.4

4.2.1 Project Planning: Perform Activity

Purpose

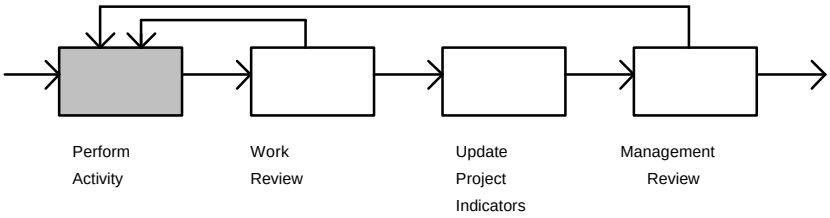
During this process of Project Planning, the plans used to manage the development of the software are produced. Before work is begun, the project needs to fully comprehend the extent of resources and time required to complete required software development activities.

The purposes of developing plans are to:

1. Gain authorization for SSC resources to satisfy an approved requirement.
2. Identify key resources to satisfy an approved requirement
3. Identify key decisions
4. Identify key participants
5. Assign responsibility
6. Identify SSC actions necessary to develop and implement the approved requirement

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Communications-Computer System Requirement Document (CSRD) has been approved.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Approved Directive/Requirements Document	Usually in the form of a PMP, OCD.
Operations Requirements Document	The overall mission area, the type of system proposed, and the anticipated operational and support concepts in sufficient detail for program and logistics support planning.
Technical Analysis and Cost Estimate	A study to determine whether a requirement can be implemented with the current resources and technology.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Software Engineering Process (SEP) Tailoring Guide	Review the SEP Tailoring Guide	Appendix D
Allocate Project Resources	Identify Resources Develop Project Manager Procedures	Atch 4.2.1-1 (Page 4-118)
Coordinate with support offices	Ensure resources are available to complete the project	Appendix E
Perform Project Planning Activities	Develop estimates -- Negotiate all estimates with affected groups Develop high-level scheduling Develop detailed schedule Develop the following plans: - Software Development Plan -- Considerations: Software Program Life Cycle Strategies; Rapid Prototyping, and Simulations -- Include system architecture (The SSC Engineering Directorate will approve/disapprove system architecture -- Estimate effort and cost	Atch 4.1.3-1 (Page 4-114) Atch 4.2.1-2 (Page 4-53) Atch 4.2.1-3 (Page 4-cxxi) Appendix L Atch 5.4.2-2 (Page 5-129) Atch 5.3.1-1 (Page 5-117)

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Activities (Cont'd)

Activity	Associated Tasks	See Procedures
Perform Project Planning Activities (Cont'd)	-- Include a plan for site communication layouts, site preparation and facility security certification/accreditation Identify logistics requirements Develop the following plans: - Software Configuration Management Plan - Software Process Assurance Plan - Test and Evaluation Master Plan - Systems Training Plan - Computer Resources Life Cycle Management Plan - Integrated Logistics Support Plan - Software Support Plan - System Security Plan - Security Test and Evaluation Plan Draft Interface Requirements Agreement	 Appendix K (See below list for procedures/ format to the adjacent list of plans).
Formally Document Project Plans	Software Development Plan Software Configuration Management Plan Software Process Assurance Plan Test and Evaluation Master Plan Systems Training Plan Computer Resources Life Cycle Management Plan Integrated Logistics Support Plan Software Support Plan System Security Plan Security Test and Evaluation Plan Draft Interface Requirements Agreement	* MIL-STD-SDD (in the LAN SEP directory) Appendix G Appendix I DoDD 5000.2M, Part 7 DoDI 5000.2 Appendix K DoDI 5000.2 * MIL-STD-SDD AFSSM 5025 Atch 5.1.1-1 (Page 5-103)

*** Note:** MIL-STD-SDD is scheduled to be numbered MIL-STD-498.

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Develops project plans.
Support Offices	Provide technical assistance in the development of the plans. - SSC/SSP (Logistics) provides logistics/Computer Resources Support.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).
Functional OPR	Provides functional information for the system.
Air Education and Training Command (AETC)	Provides the necessary training/education planning to the project office.
Engineering Directorate	Provides approval/disapproval of all system technical approaches, including system architecture and hardware purchases.

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Appropriate Project Plans	To include as a minimum: - Software Development Plan - Software Configuration Management Plan - Software Process Assurance Plan - Test and Evaluation Master Plan - Integrated Logistics Support Plan - Systems Training Plan - Computer Resources Life Cycle Management Plan - Software Support Plan - System Security Plan - Security Test and Evaluation Plan - Draft Interface Requirements Agreement

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Schedule	Number of man-hours expended in this stage

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Required plans have been produced.
	A core project team has been assigned and trained.
	Project and system security risks have been identified, documented and the impact assessed.
	All estimates are documented for project planning and tracking.
	All project activities and commitments are planned and documented.
	All affected individuals and/or groups agree to commitments related to the project.

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4.2.2 Project Planning Work Review

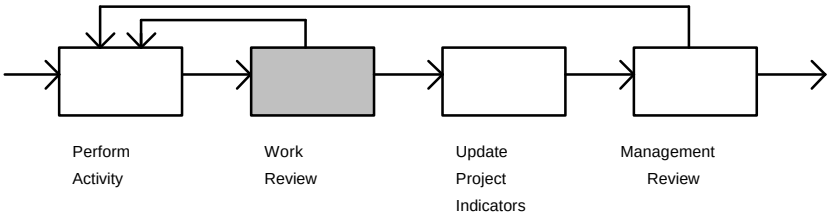
Purpose

The purpose of this review is to ensure that:

1. Appropriate support and functional organizations are identified and given the opportunity to assess the technical content of the project plans
2. Project plans are reviewed for technical content:
   - documented in accordance with SSC policies, procedures, and standards
   - stated in terms that are complete, consistent, unambiguous, feasible, and testable
3. Technical risks are identified and documented

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The required project plans are documented.
	Funding and resources are allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Draft Project Plans	All plans developed during this stage.
Review Checklist and/or Questionnaire	Any questionnaire or checklist tools developed to assist the review process.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedure
Review Preparation	Develop and Distribute review package	Appendix A (Page A-10)
Conduct the Review	Review documents IAW SSC Work Review Procedures Material to review include: - Project Plans (to include as a minimum) -- Software Development Plan -- Software Configuration Management Plan -- Test and Evaluation Master Plan -- Integrated Logistics Support Plan -- Computer Resources Life Cycle Management Plan (CRLCMP) -- System Security Plan -- Security Test and Evaluation Plan	Appendix A (Page A-14)
	Ensure that the following requirement areas are addressed in the project plans: Project Schedules: - Near-term Detailed Schedule - Long-term Schedule	Appendix A (Page A-14)
Review Follow-up	Track, address, and publish review issues Develop review minutes package Distribute review minutes package	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Presents project plans for review
Functional OPR	Represents functional viewpoint in review
Review Panel	Reviews material
Support OCRs	Support review panel, as needed, on specific items
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Technical Risks	Technical risks identified during the review including system security risks.
Review Defect Report	Defects identified during the review.
Review Action Items	Action items taken during the review.
Review Minutes	Minutes of the review.
Review Recommendation	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Schedule	Hours expended categorized by: - Project office preparation - Reviewer preparation - Conduct of the review (length)
Requirements	Defects, errors, and omissions found during the review.

Exit Criteria

The required plans have been technically reviewed.

IF Review Panel ...	THEN ...
Approves Technical Content	Project proceeds to Update Project Indicators stage.
Disapproves Technical Content	The project plans are recycled to the Project Planning Perform stage for further refinement.

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4.2.3 Project Planning: Update Project Indicators

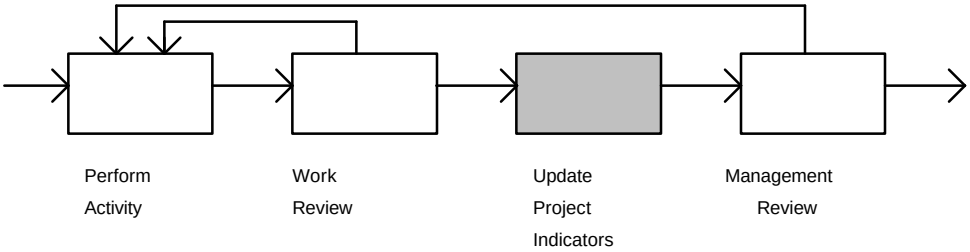
Purpose

The purpose of this stage is to:

1. Update project management indicators (size, cost, and schedule)
2. Evaluate project risk and assess impact

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	All required project plans have been developed and reviewed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Project Plans	All plans associated with the project.
Previous Estimation Procedures	Size, cost, and schedule estimates.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-44)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Performs activities associated with this process.
Support Offices	Provide support as requested by Project Office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Size Estimate	Revised size estimate.
Cost Estimate	Revised cost estimate.
Schedule Estimate	Revised schedule estimate
Risk Analysis Report	Revised risk analysis.

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Schedule	Estimated schedules and elapsed time in weeks, months, and/or years
Requirement	Number of action items assigned by the Approval Authority Percent of elapsed schedule

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.
	Project and system security risks have been re-evaluated and their impacts assessed.

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4.2.4 Project Planning: Management Review (System Requirements Review) (Milestone I, DoDD 5000.1)

Purpose

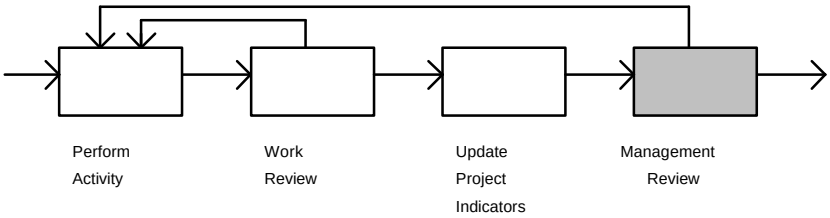
The purpose of this review is to:

1. Provide management visibility of key quality and performance indicators.
2. Obtain approval/disapproval of the project planning documents.
3. Review initial project size, cost, and schedule estimates.
4. Review project risk areas.
5. Approve/disapprove continuation of the project
6. Approve and allocate resources and funding to accomplish the next phase.

During this stage, management approves/disapproves the continuation of the project based on revised size, cost, and schedule estimate, and technical feasibility.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The project plans have been defined, analyzed, reviewed, and documented.
	Project size, cost, and schedule estimates have been revised based on the project plans.
	Project and system security risks have been analyzed and their impacts assessed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Requirements Package	Requirements and support studies
Project Plans	All plans associated with the project.
Revised Project Management Estimates	Size, cost, and schedule
Project and System Security Risks	Revised project and system security risk analysis.
Work Review Minutes	Minutes from the Work Review.
Work Review Action Items	List of all Action Items from the Work Review.
Work Review Recommendation	Recommendation from the Work Review.

Activities The following activities are performing during this stage.

Activity	Associated Tasks	See Procedure
Review Preparation	Develop and Distribute review package	Appendix A (Page A-10)
Conduct the Review	Review documents IAW SSC management's review procedures. Material to review include: - Overview of Project Plans (to include as a minimum) -- Software Development Plan -- Software Configuration Management Plan -- Test and Evaluation Master Plan -- Integrated Logistics Support Plan -- Computer Resources Life Cycle Management Plan (CRLCMP) -- System Security Plan -- Security Test and Evaluation Plan - Requirements -- Program Funding Requirements -- Manpower Requirements (to include: direct , support, overhead, and functional) - Overview of Work Review -- Recommendations/Action Items/Risks - Status of effort expended to date - Resources impact and costs Review and Approve Project Management Estimates and plans: - Project Size Estimates - Project Cost Estimates - Project Schedules -- Near-term Detail Schedule -- Long-term Schedule Decisions to make: -- Approve schedule estimates	Appendix A (Page A-14)
Review Follow-up	Track, address, and publish review issues Develop review minutes package Distribute review minutes package	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Appropriate Approval Authority)	Preside, Approve/Disapprove
Project Office	Presents review material to management
Review Panel	Assists Management in the decision process
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Project Plans	Becomes the project management baseline.	F
Approved Revised Project Estimates	Revised size, cost, and schedule estimates.	I
Project Management Risks	Management risks identified during the review.	I
Review Defect Report	Defects identified during the review.	I
Review Action Items	Action Items taken during the review.	I
Review Minutes	Minutes of the review.	I
Approval Authority's Continuation Decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	I

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Schedule	Hours expended categorized by: - Project Office Preparation - Reviewer Preparation - Conduct of the Review - Estimated schedules and elapsed time in weeks, months, and/or years

Exit Criteria

Management has to commit to allocation resources to implement the project plans. The project plans are baselined. Otherwise, the project plans are recycled through the Project Planning - Perform stage or the project is canceled.

IF Approval Authority ...	THEN ...
Approves Continuation	The project proceeds to the Development phase.
Disapproves Continuation	The project plans document and associated material are recycled to the Project Planning Perform stage for further refinement.
Cancels Project	Refer to Cancellation process (see Appendix H).

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Atch 4.1.1-1
Operational Concept Document (OCD)

Procedures

The following table outlines the procedures necessary to prepare an Operational Concept Document (OCD).

√	**Procedures**
	Base the OCD on the broad requirements of an Operational Requirements Document or a Communications-Computer System Requirements Document
	Include users who currently perform, or will perform, the functions described in the OCD on a regular basis, especially the end user
	Ensure the document describes specific functional requirements and contains clear, concise, and accurate information
	Obtain a consensus among development, support and user agencies and contractors on the operational (function) concept of the proposed system
	Sample instructions for completing an OCD are in MIL-STD-SDD.

Atch 4.1.3-1
Develop Estimates

Procedures This table outlines the procedures to follow in order to develop project estimates.

√	Procedures
	The following activities should be developed in estimating and scheduling: • **Work Breakdown Structure** (Ref: MIL-STD-881B"Work Breakdown Structures for Defense Material Items"; See Atch 4.1.3-1(a)) 1. Review MIL-STD-881B 2. Develop Work Breakdown Structure IAW MIL-STD-881B • **Risk Management** (Refs: Risk Management, Text and Cases, Green and Serbein, 1978; SEI-93-TR-6) 1. Review Risk Management Guide and Textbook 2. Develop Risk Management Plan 3. Manage to the Risk Management Plan • **Software Size** (Refs: Function Point Counting Practices Manual, Release 3.1, International Function Point User Group; Function Point Tips and Techniques, SSC Internal Document; *There are two approved methods for determining software size:* 1. Function Points a. Review Function Point reference material b. Obtain training if not familiar with Function Point counting c. Follow Function Point counting procedures 2. Lines of Code a. Review Lines of Code Counting reference material b. Obtain training if not familiar with Lines of Code counting c. Follow Lines of Code counting procedures

Atch 4.1.3-1(a)
Work Breakdown Structure

Procedures

The table below outlines a sample Work Breakdown Structure (WBS) for processing requirements.

Item	Procedures
	The following is a sample of an overall listing of the major headings for a work breakdown structure (WBS) for processing requirements:
1.0	Requirements - Objectives and requirements - approved - Initial development - signed off - Preliminary user's manual - user approved
2.0	Phase 1 Review - Approval to proceed with the design phase
3.0	Product Design - Product design - reviewed - Component specifications - approved - System/acceptance test plans - reviewed
4.0	Component Design - Module designs - reviewed - Component test plan -reviewed - Updated development plan - approved
5.0	Phase 2 Review - Approval to proceed with implementation
6.0	Implementation - All code inspected - All modules complete unit test - Updated development plan - All test cases inspected - All manuals reviewed
7.0	Phase 3 Review - Product pricing approval - Support plan approval - Approval to complete development

continued on next page ...

Procedures (Cont'd)

Item	Procedures
8.0	Test - Modules, components, and system tested - Product objectives verified - Updated development plan
9.0	Phase 4 Review - Approval to ship to customer(s) - Approval to implement support plan
10.0	Release - Product shipped to customer
11.0	Acceptance - Completion of acceptance test - Customer acceptance of product
12.0	Phase 5 Review - Post mortem review of development - Updated support plans - Product enhancement plans Note: The subordinate bullet(s) beneath each item represents the item results.

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Atch 4.1.3-1(a), Continued
Work Breakdown Structure

Procedures The table below outlines a sample Work Breakdown Structure (WBS) for estimating program cost.

Item	Procedures
	The following is a sample of a more detailed portion of a work breakdown structure for estimating program cost:
1.0	Total Program Costs
1.1	- System Engineering/Program Management
1.1.1	-- Military Pay
1.1.2	-- Civilian Pay
1.1.3	-- SETA Support
1.2	- Software Development
1.2.1	-- Commercial Off The Shelf Tools (COTS)
1.2.2	-- Developed Software
1.3	- Hardware Development
1.3.1	-- COTS Hardware
1.3.2	-- Developed Hardware
	Note: This sample can be expanded or items can be deleted to suit each program. The idea is to allocate development costs to the lowest logical level.

Atch 4.2.1-1
Identify Resources

Procedures

The table below outlines procedures to be followed while performing the responsibilities of a project manager.

√	**Develop Project Managers Procedures**
	• A project manager 's role with total business responsibilities for a project is fulfilled through: - Directing, - Controlling, - Administering and, - Regulating the entire project.
	• The following outlines the responsibilities for all software activities for a project to be performed by the project manager: - Follows a written organizational policy for managing the software project, - A documented software development plan is used and maintained as the basis for tracking the software projects, - Kept informed on the software project's status and issues, - Corrective actions are taken when the software plan is not being achieved, either by adjusting performance or by adjusting the plans, - Changes to the software commitments are made with the involvement and agreement of the affected group and, - Explicitly assigns responsibility for software work products and activities. Note: The project manager is the individual ultimately responsible to the customer.

Reference

The Software Engineering Institute (SEI) Capability Maturity Model Version 1.1 February 1993.

Atch 4.2.1-2
Develop High-Level Schedule

Purpose

Good scheduling procedures include predicting the amount of time and personnel required to complete each subphase of a project. High-level scheduling is used to estimate the major milestones and manpower requirements for a given project based on the size, estimated effort, and available personnel. The schedule and manpower estimates should be updated, at a minimum, during each subphase of development.

The effort required to complete a given software development or modification project is divided among the various subphases of the project. Subphase effort distribution factors are used to allocate the effort to each of the subphases to determine the high-level schedule.

Each development activity must determine its own subphase distribution factors based on the unique situation of the particular development effort. The actual factor used will depend on a number of factors including size of the effort, user involvement, quality of requirements documents, experience level of programming staff, etc.

Procedures

Two steps are required to develop a high level schedule:
a) Subphase Effort Distribution
b) Manpower and High Level Scheduling

a. Subphase Effort Distribution.

Step	Description
1	Determine Subphase Effort Distribution Factors. Using historical information and available expertise, estimate the percentage of the overall effort that falls into each of the software development subphases.
2	Determine Subphase Effort Distribution. For each Program Unit, multiply the Subphase Effort Distribution factor for each subphase by the estimated effort for the unit.
3	Total Results. Add the results for each subphase.

continued on next page ...

Procedures (Cont'd)

b. Manpower and High-Level Scheduling.

Step	Description
4	Estimate Subphase Manpower Requirements. Using manpower ramp-up analysis, historical information and available expertise, estimate the manpower required to complete each subphase based on the effort. Manpower requirements depend on a number of factors including availability, level of experience, skill level, etc. Although there is no specific formula for determining the optimal manpower level, drawing the ramp-up curve for the project is especially helpful in determining the effect of manpower on the schedule. Experiment with several different manpower levels to find a curve that provides a realistic schedule based on a reasonable manpower level. (Note: although manpower ramp-up analysis shows manpower increases at the start of the subphase, in reality additional personnel should be trained and brought in gradually as part of the build-up to the next development subphase.)
5	Determine the Estimated High-Level Schedule. Divide the effort estimate for each subphase by the manpower estimate to determine the length of time required to complete the subphase. Total the result of each subphase to determine the overall high-level schedule for the project.

Atch 4.2.1-3
Develop Detailed Schedule

Overview

There are three activities required to complete a detailed schedule:

1. Develop a dependency graph or PERT chart.
2. Perform a workload analysis on the graph using either (pick one)
   a. "Forward Pass" analysis
   b. "Backward Pass" analysis
3. Schedule program units.

Develop Dependency Graph

In order to compute a dependency graph the following steps should be accomplished.

Step	Description
1	Determine Program Unit Interdependencies. For each subphase of a project, examine each program unit as it relates to other program units, modules, subsystems, etc., to determine interdependencies. For example, if work on program unit "x" cannot start until program unit "y" is finished, "x" is dependent on "y."
2	Build Dependency Graph. Build a dependency graph for each subphase of the project showing the interdependencies identified in Step 1. Use lines to connect each activity node in the graph.

"Forward Pass" Analysis

A "Forward Pass" analysis of a dependency graph is accomplished by completing the following steps:

Step	Description
3	Determine Personnel Loading (PL). For each activity node on the dependency graph, estimate the number of people that will be assigned to that activity. Annotate the result above the activity node on the dependency graph. Bear in mind that the total number of personnel assigned to each subphase of the project was estimated in the previous section.
4	Attach the Estimated Effort (EE). Annotate the estimated effort required for each activity node on the dependency graph.

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"Forward Pass" Analysis (Cont'd)

Step	Description
5	Calculate the Duration (D) of each Node. For each activity node, divide the estimated effort (EE) by the number of personnel assigned to the activity. Annotate the result on the dependency graph.
6	Calculate Early Start and Early Finish Times. Begin at the "start" node in the dependency graph and work toward the "end" node following each path through the graph. The earliest start time for a given activity node is equal to the earliest finish time of the previous node. Add the duration (D) of the activity to the earliest start time to calculate the earliest finish time for the activity. Annotate the results on the dependency graph. Note that the earliest start/finish time of the "start" node is equal to the ending time of the previous subphase dependency graph, or zero in the case of the definition subphase. The earliest start/finish time of the "end" node is equal to the greatest early finish time of all paths.

"Backward Pass" Analysis

A "Backward Pass" analysis of a dependency graph is accomplished by completing the following steps:

Step	Description
7	Calculate late start and late finish times. Begin at the "end" node in the dependency graph and work toward the "start" node following each path in the graph. The latest finish time for a given activity node is equal to the latest start time of its succeeding node. Subtract the duration (D) of the activity from the latest finish time to calculate the latest start time for the activity. Annotate the results on the dependency graph.
8	Calculate slack time. Calculate the slack time for each activity node, by subtracting the earliest start time from the latest start time. Annotate the results on the dependency graph.
9	Identify the critical path(s). The path(s) in which all activity nodes have a slack time of zero is(are) the critical path(s).

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Atch 4.2.1-3, Continued
Develop Detailed Schedule

Schedule Program Units

To schedule individual program units, complete the following steps.

Step	Description
10	Determine scheduled start times. For each subphase of the project, examine the completed dependency graphs and schedule the start date for each program unit in the subphase. Normally, the scheduled start time will be the earliest start time.
11	Determine scheduled finish times. For each subphase of the project, examine the completed dependency graphs and schedule the finish date for each program unit in the subphase.

Important Notes
System Implementation - It is imperative that tasks for site communication layouts, site preparation (electrical, cooling, and construction), and facility security certification/accreditation be included in the detailed schedule. - As a general rule, these tasks should be started a year or earlier before the system will be implemented.

5.0

The Development Phase

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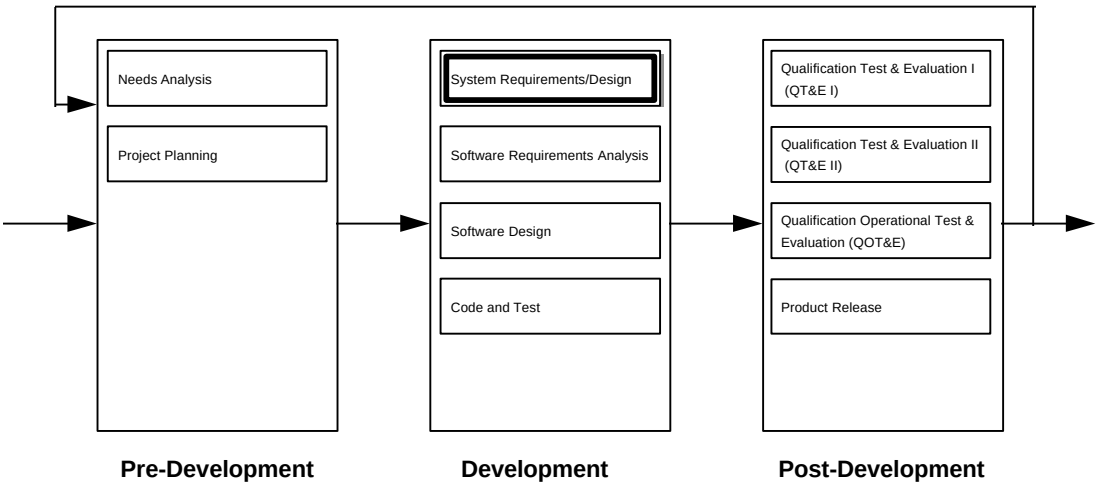
5.1 System Requirements/Design: Overview

Definition

System Requirement : *"A condition or capability needed by a user to solve a problem or achieve an objective."* ANSI/IEEE Std 729-1983

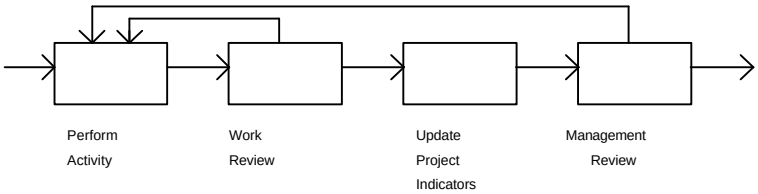
Where We Are

This diagram illustrates where the System Requirement process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete the System Requirement process.



In This Section

The specific System Requirement stages will be covered in the following sections.

Stages	Section
Perform Activity	5.1.1
Work Review	5.1.2
Update Project Indicators	5.1.3
Management Review	5.1.4

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5.1.1 System Requirements/Design: Perform Activity

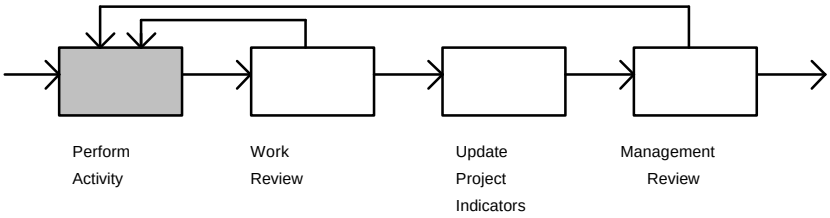
Purpose

The purpose of this stage is to:

1. Further define the user's system requirements.
2. Identify any constraints.
3. Analyze the requirements.
4. Categorize the requirements.
5. Formally document the requirements.
6. Develop the Functional Baseline.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Approved Project Plans	To include as a minimum: - Software Development Plan - Software Configuration Management Plan - Program Management Plan - Communications-Computer System Requirements Document/Operational Requirements Document - Software Support Plan - Integrated Logistics Support Plan - Test and Evaluation Master Plan - Computer Resources Life Cycle Management Plan - Operational Concept Document

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Preparation	Obtain training on requirements analysis. Identify and plan customer involvement. Coordinate activities with SSC support offices.	Atch 5.1.1-1 (Page 5-226) Appendix E
Identify/Elicit User Requirements	Review existing documentation/software. Analyze problem domain analysis Conduct customer Interview. Conduct user surveys. Identify and evaluate reusable system requirements.	Atch 5.1.1-1 Appendix F
Analyze System Requirements	Specify the requirements for the system or a segment of the system. Establish Interface Control Working Group. Update Risk Analysis Document Update Software Development Plan Update Test and Evaluation Master Plan Perform logistics support analysis - Update the CRLCMP and ILSP Research standard data elements and data standardization Complete Interface Requirements Agreement Develop System/Segment Design Document Develop System/Segment Specification Develop Requirements Traceability Matrix Draft the following: - Security Documents - Interface Requirement Specifications - Software Requirements Specifications	Atch 5.1.1-1 DoDD 5000.2M, Part 7 Appendix K Appendix C (See below list for procedures/ format to the adjacent list of plans and documents).
Formally Document User's System Requirements	Requirements Traceability Matrix System/Segment Specifications Test and Evaluation Master Plan Interface Requirement Agreement System/Segment Design Document Draft Security Documents Draft Interface Requirement Specifications Draft Software Requirements Specifications	Atch 5.1.1-1 (Page 5-226) MIL-STD-SDD DoDD 5000.2M, Part 7 Atch 5.1.1-1 (Page 5-226) MIL-STD-SDD Atch 5.2.4-3 (Page 5-cclvii) MIL-STD-SDD MIL-STD-SDD

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Responsible for documenting the system requirements and coordinating with the user and support offices to ensure the requirement is complete, consistent, and actually reflects the user's intention.
Support Offices	Provide support to the project offices as needed (see Appendix E).
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced or updated in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Interface Requirement Agreement (IRA)	Agreement between program managers on external interface requirement.
System/Segment Specifications (SSS)	Description of the required system characteristics that are conditions for system acceptance. This document is used as the basis for developing and testing the system or segment.
Requirement Traceability Matrix (RTM) (draft)	Matrix that allows software features to be traced back to user requirements.
Test and Evaluation Master Plan (TEMP) (draft)	The primary document used to assess adequacy of planned DT&E. It contains a mission and/or system description, the required operational/technical characteristics, critical technical/operational issues, test management responsibilities, DT&E and OT&E outlines including objectives, and a test resource summary.
Security Document (draft)	Documents applicable security issues.
Segment Design Document (SSDD)	Description of the system/segment design used as the basis for developing requirement specifications for HWCIs, CSCIs and interfaces.
Software Development Plan (SDP) (draft)	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.

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Product Summary (Cont'd)

Product	Description
Software Requirements Specification (SRS) (draft)	The SRS specifies the engineering and qualification requirements for a Computer Software Configuration Item (CSCI).
Computer Resources Life Cycle Management Plan (CRLCMP)	The CRLCMP is the primary planning document for computer resources throughout the system life cycle.
Integrated Logistics Support Plan (ILSP)	Identifies logistics support such as maintenance needs, supply (spare parts and consumables, manpower, training, etc.), that must be addressed within the scoped operational needs.
Updated Risk Analysis Document	An interactive process providing information on aspects of a system that need protecting, threats with an impact on the system, how well the system can be protected against those threats, how to improve system security and at what cost, and what residual risk would remain.

Measurement

The following is a minimum set of measurements to collect.

Type	Measurement
Requirement	- Number of requirements to be addressed by the s/w portion of the project - type of requirement (i.e. input, output) - associated risks (i.e. critical, noncritical) - Number of risk management activities associated with the requirement
Schedule	- Number of risk management activities associated with the project planning - estimated schedules and elapsed time in weeks, months, and/or years - milestones or events - Percent of schedule elapsed - hours expended categorized by: - Number of manning positions authorized and assigned to include terms and temporary hire -- Project Office -- Support Offices -- S/W Process Assurance

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Measurement (Cont'd)

Type	Measurement
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) - Current estimate of function points
Cost	- initial estimate of cost in labor months, labor hours, and/or dollars - budgets in labor months, labor hours, and/or dollars - amount spent in labor months, labor hours, and/or dollars - Percent of budget spent to date (labor months, labor hours, and dollars)

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Software System/Specifications (SSS) and Interface Requirements Agreement (IRA) have been completed.
	Project risks have been identified, documented, and their impact assessed.

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5.1.2 System Requirements/Design Work Review

Purpose

The purpose of this review is to ensure that:

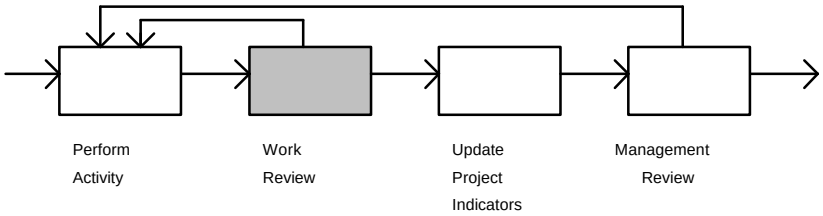
1. 1. Appropriate support and system organizations have been identified and given the opportunity to assess the technical content of the system requirements.

   2. System requirements are reviewed for technical content: - documented in accordance with SSC policies, procedures, and standards - stated in terms that are complete, consistent, feasible, testable, and reusable.
3.
3. 3. System requirements are traceable to the original user's requirements document (e.g. ORD, CSRD).

   4. Technical risks are identified and documented.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
System requirements documents	User requirements developed in previous stages to include: SDP, SSS, IRA, TEMP, RTM, Security Document, and Risk Analysis Document.
Review Questionnaire and/or Checklist	Any questionnaire or checklist tools developed to assist the review process.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Develop and Distribute review package.	Appendix A (Page A-10)
Conduct the Review	Review draft documents IAW the SSC Work Review Procedures. Material to review include: - System Segment Specifications. - System/Segment Design Document. - Interface Requirements Agreement. - Requirements Traceability Matrix. - Status of the draft documents: -- Updated Software Development Plan (SDP) Ensure the above documents are: - acceptable by the system OPR(s). - documented in accordance with policies and standards. - complete, consistent, unambiguous, feasible and testable. - traceable to the CSRD, ORD and OCD.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project Risks. - Product defects. - Review action items. - Review minutes. - Review Panel recommendation.	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Presents System Requirements document for review.
System OPR	Represents system viewpoint.
Review Panel	Reviews material.
Support OCRs	Support review panel, as needed, on specific items.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
System Requirement Documents	User Requirements developed in previous stages to include: updated SDP, SSS, IRA, updated RTM, TEMP, and Security Document.
Risk Assessment	Risks identified during the review.
Defect Report	Defects identified during the review.
Action Items	Action Items taken during the review.
Minutes	Minutes of the review.
Recommendation(s)	Review panel's recommendation on technical suitability of material presented and recommendation to proceed.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * -Number of risk management activities associated with the development activity - defects, errors, omissions found during review
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed - hours expended categorized by: * - Number of manning positions authorized and assigned to include terms and temporary hire -- Project office prep -- Support offices prep -- Conduct of review

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Measurement (Cont'd)

Type	Measurement
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate of function points.
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars * - Percent of budget spent to date (labor months, labor hours, and dollars) *revise from sec 5.1.1

Exit Criteria

The system requirement documents have been technically reviewed.

IF Review Panel ...	THEN ...
Approves technical content	Project proceeds to Update Management Indicators Stage.
Disapproves technical content	The system requirement documents are recycled to the System Requirement Perform Activity Stage for further refinement.

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5.1.3 System Requirements/Design: Update Project Indicators

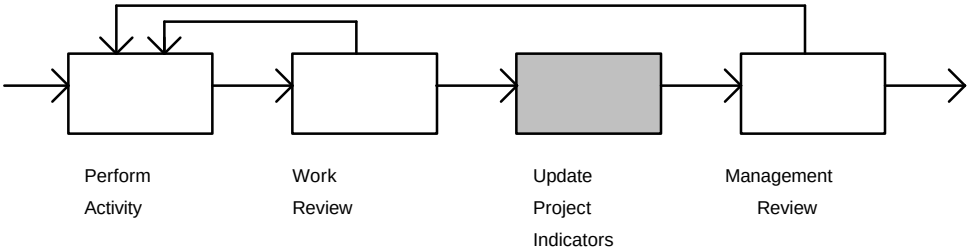
Purpose

The purpose of this process is to:

1. Update project management indicators - Size, Cost, and Schedule.
2. Evaluate project risk and assess impact.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	System requirements and related documents have been technically reviewed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
System requirement documents	User Requirements to include SDP, SSS, IRA, RTM, TEMP, and Security Document.
Estimation procedures	Current approved SSC estimation procedures.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-48)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Perform activities associated with this process.
Support Offices	Provide support as requested by Project Office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and /or procedures.

Product	Description
Size Estimate	Revised size estimate.
Cost Estimate	Revised cost estimate.
Schedule Estimate	Revised schedule estimate.
Risk Analysis Report	Revised Risk Analysis.

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* -Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * -Number of risk management activities associated with the requirement analysis activity
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed - hours expended categorized by: * - Number of manning positions authorized and assigned to include terms and temporary hire -- Project office -- Support offices
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate of function points
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars * - Percent of budget spent to date (labor months, labor hours, and dollars) *revise from sec 5.1.2

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.
	Project risks have been re-evaluated and their impact assessed.

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5.1.4 System Requirements/Design: Management Review (System Design Review) (Milestone II, DoDD 5000.1)

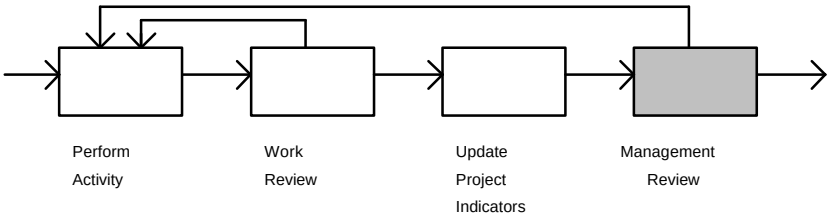
Purpose

The purpose of this review is to:

1. Provide management visibility.
2. Approve/disapprove the system requirements document (i.e., SSS).
3. Review revised project size, cost, and schedule estimate.
4. Review project risk areas.
5. Approve/disapprove continuation of the project.
6. Approve and allocate resources and funding to accomplish the next phase.
7. Establish the Functional Baseline.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Functional requirements have been defined, analyzed, reviewed, and documented
	Project size, cost, and schedule estimates have been revised based on the system requirements.
	Project risks have been analyzed and their impact assessed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software requirements documents	User requirements to include: SDP, SSS, IRA, RTM, TEMP, and security document.
Project Plans	All plans associated with the project.
Revised Project Management Estimates	Size, Cost, and Schedule estimates.
Project Risks	Revised Risk Analysis Report.
Work Review results.	Minutes, action items and recommendations from the Work Review.
Review Questionnaire/Checklist	Any questionnaire or checklist tools developed to assist the review process.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedure
Review Preparation	Review requirements for conducting a Systems Requirements Review Develop and distribute review package.	Appendix A (Page A-10)
Conduct the Review	Review documents IAW the SSC Management Review Procedures. Material to review include: - Overview of the system requirements. - Overview of Work Review (Action Items, Recommendation). - Draft Risk Analysis Report. - Revised estimates (Size, Cost, Schedule). - Status of effort expended to date. - Funding Requirements. - Resource Impact and Cost. - Plans to accomplish near-term actions. - SSC manpower requirements; Direct, Support, Overhead, and System. Decisions to make: - Baseline the SSS and IRA documents - Approve/disapprove continuation of the project.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project risks. - Product defects. - Review action items. - Review minutes. - Approval/disapproval decision. Provide system baseline to the Defense Software Reuse System.	Appendix A (Page A-15) Appendix F

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove.
Project Office	Presents review material to management.
Review Panel	Assist management in the decision process.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal and formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
System Segment Specifications Document	Description of the required system characteristics that are conditions for system accptance. This document is used as the basis for developing and testing the system or segment. It becomes a functional baseline.	F
Risk Analysis Document	Management risks identified during the review.	I
System/Segment Design Document	Description of the system/segment design used as the basis for developing requirement specifications for HWCIs, CSCIs and interfaces.	F
Interface Requirement Agreement (IRA)	Agreement between program managers on external interface requirement.	F
Approved, updated SDP	Revised project estimates (size, cost, and schedule).	I
Management review defect report	Defects identified during the review.	I
Management review action items	Action items taken during the review.	I
Management review minutes	Minutes of the review.	I
Approval authority's continuation decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	I

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity - Number of Engineering Change Proposals (ECPs) - Number of action items assigned by the Approval Authority
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed - hours expended categorized by: * - Number of manning positions authorized and assigned to include terms and temporary hire -- Project office prep -- Support offices prep -- Conduct of review -- Total hours expended
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate of function points
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars * - Percent of budget spent to date (labor months, labor hours, and dollars) *revise from sec 5.1.3

Exit Criteria

Management has committed to allocate resources to implement the requirement. The system requirements are baselined. Otherwise, the system requirement are recycled through the System Requirement Perform Activity stage or the project is canceled.

IF Approval Authority ...	THEN ...
Approves Continuation	Project proceeds to initiate the Software Requirements process.
Disapproves Continuation	The system requirements document and associated material are recycled to the System Requirements Perform Activity stage for further refinement.
Cancels Project	Refer to Cancellation process (see Appendix H).

5.2 Software Requirements: Overview

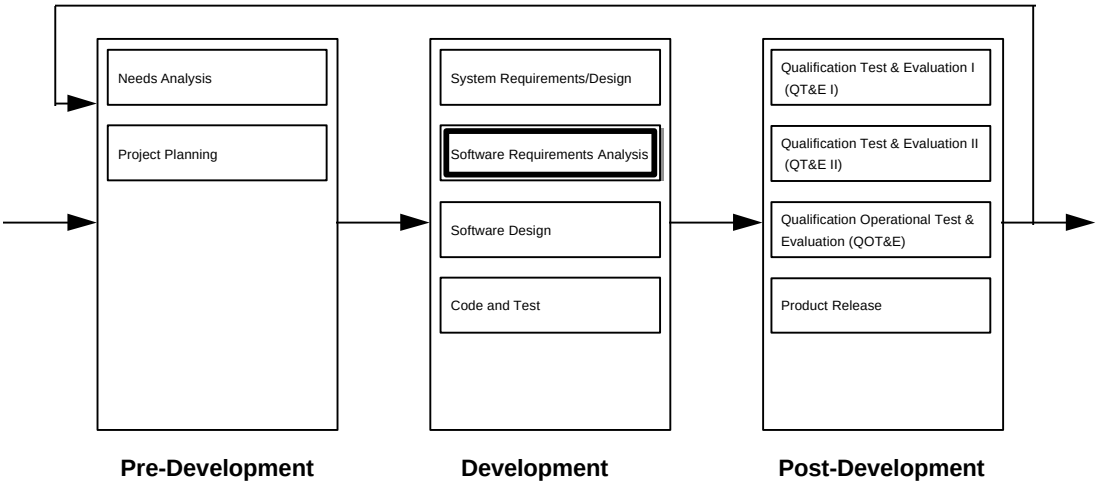
Definition

Software Requirement : *"A condition or capability that must be met or possessed by a system or a system component to satisfy a contract, standard, specification, or other formally imposed document. The set of all requirements forms the basis for subsequent development of the system or system component."*

ANSI/IEEE Std729-1983

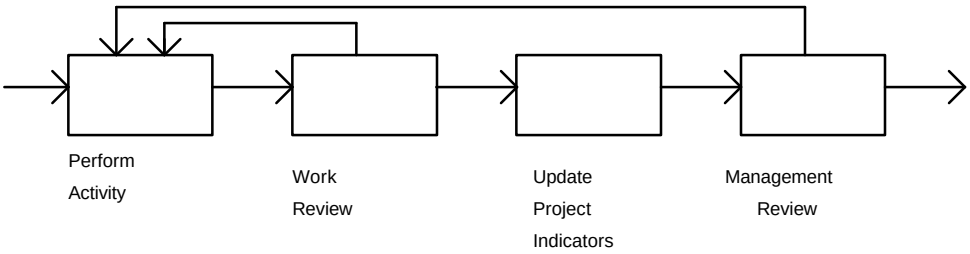
Where We Are

This diagram illustrates where the Software Requirements process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete the Software Requirement process.



In This Section The specific Software Requirement stages will be covered in the following sections.

Software Requirements Stage	Section
Perform Activity	5.2.1
Work Review	5.2.2
Update Project Indicators	5.2.3
Management Review	5.2.4

5.2.1 Software Requirements: Perform Activity

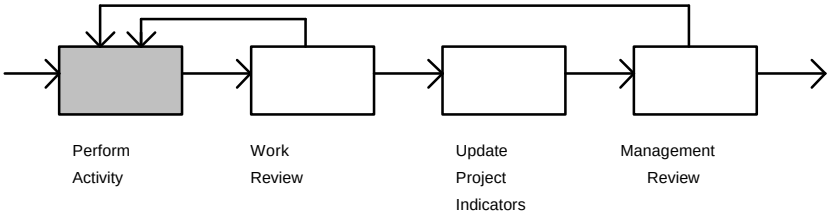
Purpose

The purpose of this stage is to translate the user's requirements into a software specification that describes what functions the software/system is to perform.

The software requirements cover the software functions and performance, the interfaces to both hardware and software, and the human-computer interface.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Approved system requirements documents	User requirements developed and approved during the system requirements process to include: - System Segment Specifications. - System/Segment Design Document. - Interface Requirement Agreement. -Test and Evaluation Master Plan. - Updated Risk Analysis Document. - Security Requirements. - Updated Software Development Plan
Requirements Traceability Matrix	Matrix allowing software features to be traced back to system requirement.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Preparation	Obtain training in software requirements methodology. Identify and plan customer involvement. Identify and evaluate reuse software. Coordinate activities with SSC Support Office.	Atch 5.2.1-1 (Page 5-239) Appendix F Appendix E
Define and develop software requirements	Review system requirements. Develop prototypes as required. Reuse the available software requirements. Complete Software Requirements Specifications. Complete Interface Requirements Specifications. Update Test and Evaluation Master Plan Update Software Development Plan Update Requirements Traceability Matrix.	Atch 5.2.1-1 Appendix F (See below list for procedures/ format to the adjacent list of documents). Atch 5.1.1-1 (Page 5-226)
Formally document software requirements	Software Requirements Specifications (SRS) Interface Requirements Specifications (IRS)	MIL-STD-SDD MIL-STD-SDD
Establish requirements validation criteria	Identify and document method for verifying each software requirement: Draft Software Test Plans Draft Software Test Descriptions Test and Evaluation Master Plan	 MIL-STD-SDD MIL-STD-SDD DoDD 5000.2M, Part 7
Update system requirements	Submit a Baseline Change Request (BCR) to Update the Software/System Specifications Document as necessary.	Appendix G

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Responsible for documenting the software requirements and coordinating with the user and support offices to ensure the requirement is complete, consistent, and actually reflects the users intention.
Support offices	Provide support to the project offices as needed (see Appendix E for a detailed list).
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Software Requirement Specifications (SRS)	Specifies the engineering and qualification requirements for a Computer Software Configuration Item (CSCI), used as the basis for developing and testing a CSCI and becomes part of the Allocated Baseline.
Requirement Traceability Matrix (RTM)	Matrix allowing software features to be traced back to system requirement.
Interface Requirement Specifications (IRS)	Specifies the requirements for one or more interfaces between one or more CSCIs and other configuration items or critical items.
Test and Evaluation Master Plan (TEMP) (draft)	The primary document used to assess adequacy of planned DT&E. It contains a mission and/or system description, the required operational/technical characteristics, critical technical/operational issues, test management responsibilities, DT&E and OT&E outlines including objectives, and a test resource summary.
Security Requirements	Documents applicable security issues.
Software Development Plan (SDP)	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.

Measurement
.

This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* - Number of requirements to be addressed by the s/w portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of ECPs - Percent/Number of action items open/closed to date - required transaction time - required response time - required availability
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed - elapsed development time - hours expended categorized by: * - Number of manning positions authorized and assigned to include terms and temporary hire -- Project office -- Support offices -- Software Process Assurance -- Total hours
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate in function points
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) *revise from sec 5.1.4

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	**Exit Criteria**
	The Software Requirements Specifications and Interface Requirements Specifications have been completed.
	The Software Test Plan , Software Test Description and test cases are documented.
	Project risks have been identified, documented, and their impact assessed.

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5.2.2 Software Requirements Work Review

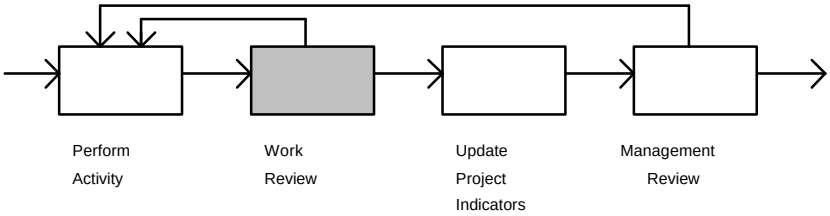
Purpose

The purpose of this review is to ensure that:

1. Appropriate support and system organizations have been identified and given the opportunity to assess the technical content of the software requirements.
2. Software requirements are reviewed for technical content:
   - documented in accordance with SSC policies, procedures, and standards.
   - stated in terms that are complete, consistent, feasible, testable, and reusable.
3. Software requirements are traceable to the original user's need statement and the approved system requirements.
4. Technical risks are identified and documented.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software Requirement Documents	Software requirements documents developed in the previous stages to include: SRS, IRS, RTM, SDP and Security Document, and Risk Analysis Document.
Review Questionnaire and/or Checklist	Any questionnaire or checklist tools developed to assist the review stage.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Develop and distribute review package.	Appendix A (Page A-10)
Conduct the Review	Reveiw draft documents IAW the SSC Work Review Procedures. Materials to review include: - Software Requirement Specification. - Interface Requirements Specification. - Requirement Traceability Matrix. - Status of the draft documents: -- Updated Software Development Plan (SDP) Ensure software requirements are: - documented in accordance with policy and standards. - complete, consistent, unambiguous, feasible, testable and reusable. - traceable to the system requirements. - Identify project risks.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project Risks - Product defects - Review action items - Review minutes - Review Panel recommendation	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Presents Software Requirements and associated documents for review.
System OPR	Represents system viewpoint in review.
Review Panel	Reviews material.
Support OCR's	Support review panel, as needed, on specific items.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Software Requirements Document	Software requirements documents developed in the previous stages to include: SRS, IRS, updated RTM, TEMP, updated SDP, and security document.
Risk Analysis Document	Risks identified during the review.
Defect Report	Defects identified during the review.
Action Items	Action Items taken during the review.
Minutes	Minutes of the review.
Recommendation(s)	Review panel recommendation on technical suitability of material presented.

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of ECPs - defects, errors, omissions found during review
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: * - Number of manning positions authorized and assigned to include terms and temporary hire -- Project office prep -- Support offices prep -- Conduct of review
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate of function points
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) *revise from sec 5.2.1

Exit Criteria

The software requirement documents have been technically reviewed.

IF Review Panel ...	THEN ...
Approves Technical Content	Project proceeds to the Update Management Indicators stage.
Disapproves Technical Content	The software requirements document and associated material are recycled to the Software Requirements Perform stage for further refinement.

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5.2.3 Software Requirements: Update Project Indicators

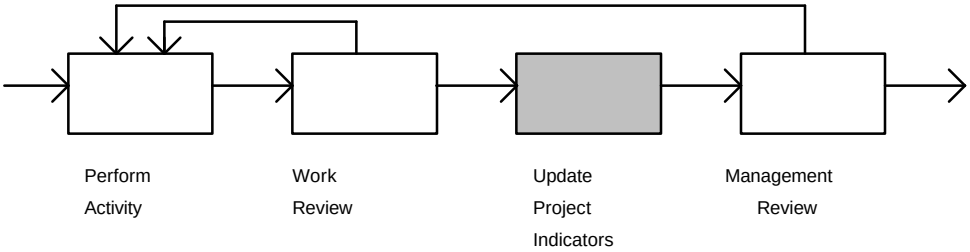
Purpose

The purpose of this stage is to:

1. Update project management indicators - Size, Cost, and Schedule.
2. Evaluate project risk and assess impact.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	All software requirements have been technically reviewed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software Requirement Documents	Defines the software requirements to be implemented to include: SRS, IRS, RTM and SDP.
Estimation Procedures	Current approved SSC estimation procedures.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-48)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Perform activities associated with this stage.
Support Offices	Provide support as requested by Project Office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Size estimate	Revised size estimates.
Cost estimate	Revised cost estimates.
Schedule estimate	Revised schedule estimates.
Risk analysis report	Revised risk analysis report.

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of ECPs
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: * - Number of manning positions authorized and assigned to include terms and temporary hire -- Project office -- Support offices
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate of function points
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) *revise from sec 5.2.2

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.
	Project risks have been re-evaluated and their impact assessed.

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5.2.4 Software Requirements: Management Review (Software Specification Review) (Milestone III, DoDD 5000.1)

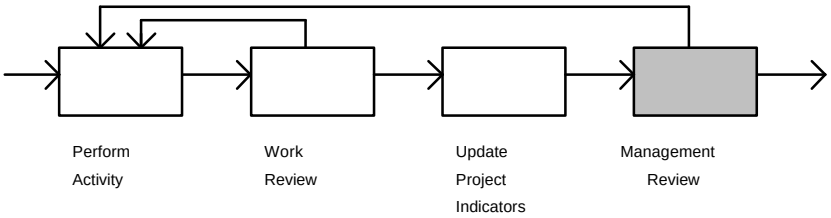
Purpose

The purpose of this review is to:

1. Provide management visibility.
2. Approve/disapprove the software requirements document.
3. Review initial project size, cost, and schedule estimate.
4. Review project risk areas.
5. Approve/disapprove continuation of the project.
6. Approve and allocate resources and funding to accomplish the next phase.
7. Establish the Allocated Baseline.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Project size, cost, and schedule estimates have been revised based on the software requirements.
	Project risks have been analyzed and their impact assessed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software Requirements Documents	Completed SRS and IRS; updated RTM and SDP.
Project Plans	All plans associated with the project.
Revised Project Management Estimates	Size, cost, and schedule.
Project Risks	Revised Risk Analysis.
Work Review results	Minutes, action items and recommendations from the Work Review.
Review Questionnaire/ Checklist	Any questionnaire or checklist tools developed to assist the review process.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Review requirements for conducting a Software Specifications Review Develop and distribute review package	Appendix A (Page A-10)
Conduct the Review	Review documents IAW the SSC Management Review Procedures. Materials to review include: - Overview of the Software Requirements. - Overview of Work Review (Action Items, Recommendations, etc.). - Risk Analysis Report. - Revised estimates (size, cost, schedule). - Status of effort expended to date. - Funding requirements. - Resource impact and cost. - Plans to accomplish near-term actions. - SSC manpower requirements; Direct, Support, Overhead, System. Identify project risks. Decisions to make: - baseline the SRS and IRS - approve/disapprove continuation of the project.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project Risks. - Product defects. - Review action items. - Review minutes. - Approval/disapproval decision. - Provide Allocated Baseline to the Defense Software Repository System (DSRS).	Appendix A (Page A-15) Appendix F

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove.
Project Office	Presents review material to management.
Review Panel	Assist Management in the decision process.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I ' or 'F ' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Software Requirements Specifications (SRS)	Specifies the engineering and qualification requirements for a Computer Software Configuration Item (CSCI), used as the basis for developing and testing a CSCI and becomes part of the Allocated Baseline.	F
Interface Requirement Specifications (IRS)	Specifies the requirements for one or more interfaces between one or more CSCIs and other configuration items or critical items.	F
Approved updated SDP	Revised project estimates (size, cost, and schedule).	I
Risk Analysis Document	Management risks identified during the review.	I
Management reviewed defect report	Defects identified during the review.	I
Management reviewed action items	Action items taken during the review.	I
Management reviewed minutes	Minutes of the review.	I
Approval authority's continuation decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	I

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of ECPs - Number of action items assigned by the Approval Authority
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: * - Number of manning positions authorized and assigned to include terms and temporary hire -- Project office prep -- Support offices prep -- Conduct of review -- Total hour expended
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate in function points
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) *revise from sec 5.2.3

Exit Criteria

Management commit to allocation resources to implement the software requirements. The software requirements are baselined. Otherwise, the software requirement are recycled through the Software Requirement Perform Activity stage or the project is canceled.

IF Approval Authority ...	THEN ...
Approves Continuation	The project proceeds to the Software Design Phase.
Disapproves Continuation	The software requirements and associated material are recycled to the Software Requirements Perform Activity stage for further refinement.
Cancels Project	Refer to cancellation process (see Appendix H).

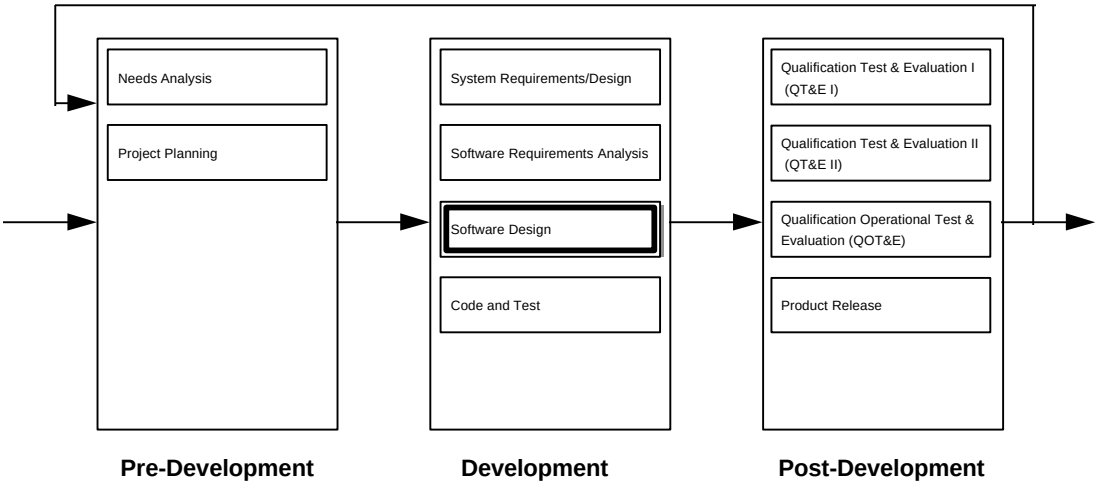
5.3 Software Design : Overview

Definition

<u>Software Design</u> : *"The period of time in the software life cycle during which the designs for architecture, software components, interfaces, and data are created, documented, and verified to satisfy requirements."* ANSI/IEEE Std 729-1983

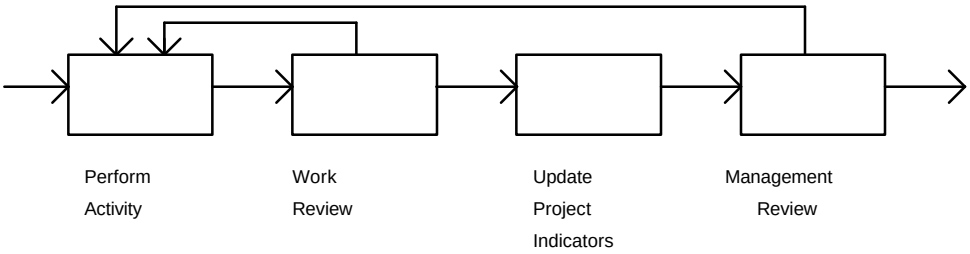
Where We Are

This diagram illustrates where the Software Design process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete this process.



In This Section The specific Software Design stages will be covered in the following sections.

Software Design Stage	Section
Perform Activity	5.3.1
Work Review	5.3.2
Update Project Indicators	5.3.3
Management Review	5.3.4

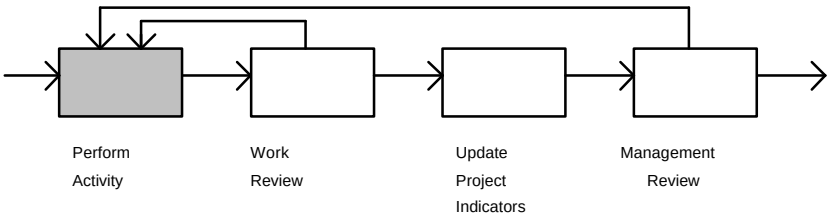
5.3.1 Software Design: Perform Activity

Purpose

The Software Design Documents are created in this stage to plan for the implementation of system requirements through software.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Approved software requirements documents	User requirements to include: - Test and Evaluation Master Plan (TEMP) - Security Document - Software Requirement Specifications (SRS) - Interface Requirement Specifications (IRS) - Software Development Plan (SDP)
Requirements Traceability Matrix (RTM)	Matrix allowing software design features to be traced to software requirement specifications.

Activities

NOTE: This stage varies in scope and complexity, depending on the overall requirements of the system. Consider the following options:

a. Conduct a peer review following architectural or conceptual database design.
b. Create a separate document describing human-computer interfaces
c. Conduct a separate review for each CSCI and interface design.

The following activities are performed during this stage:

Activity	Associated Tasks	See Procedures
Preparation	Obtain training for Design Methodology. Review SSC Standards on Design Analysis.	Atch 5.3.1-1 (Page 5-241)
Design the Software	Review System and Software requirements document. Update Architectural Design Data Base Design: - Conceptual. - Logical. - Physical. Detailed Design (software sub components): - Data Structures. - Algorithms. - Control information. Update Software Development Plan Update Requirements Traceability Matrix Design Interface(s). Develop Design Prototypes. Reuse available software design assets. Periodically review and inspect the design. Coordinate tasks with appropriate working group(s). Use standard data elements Develop the following: - Software Design Document - Interface Design Document - Database Design Document - Computer Center Software Operator Manual (Draft, top level) - Software User Manual (Draft, top level)	Atch 5.3.1-1 MIL-STD-SDD Atch 5.1.1-1 (Page 5-226) Atch 5.3.1-1 Appendix F Atch 5.3.1-1 Appendix C (See the below list for procedures/ format to the adjacent list of documents)

continued on next page...

Activities (Cont'd)

Activity	Associated Tasks	See Procedures
Formally Document the Software Design	Software Design Document Interface Design Document Database Design Document Requirements Traceability Matrix Update draft of all test documentation: - Software Test Plan - Software Test Descriptions/Cases Computer Center Software Operator Manual (CCSOM) (Draft,top level) Software User Manual (SUM) (Draft, top level)	MIL-STD-SDD MIL-STD-SDD MIL-STD-SDD Atch 5.1.1-1 (Page 5-226) MIL-STD-SDD MIL-STD-SDD MIL-STD-SDD MIL-STD-SDD
Coordinate Activities	Contact Appropriate Working Group(s).	Atch 5.3.1-1 (Page 5-241)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Responsible for documenting the software design and coordinating with the user and support offices to ensure the design is complete, consistent, and actually reflects the users intention.
Support Offices	Provide support to the project offices as needed (see Appendix E).
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Software Design Document (SDD)	Software design developed to address system requirements.
Database Design Document (DBDD)	A DBDD describes the logical and physical design of a database and gives information necessary for the construction of the database and for its use by application programmers.
Requirement Traceability Matrix (RTM)	Matrix allowing software features to be traced back to system requirement.
Interface Design Document (IDD)	Technical description of all external interfaces that need to be accommodated.
Software Test Plan, Software Test Description and Test Cases (Draft)	All test documentation associated with the project.
Computer Center Software Operator Manual (CCSOM) (Draft)	Manual describing all software operational requirements.
Software User Manual (SUM) (Draft)	Instructions for software user.
Security Document	Identifies all security risks.
Software Development Plan (SDP)	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirements	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs - Percent/Number of action items open/closed to date - required transaction rate - required response time - required availability - Number of pages of documentation by document name; pages can be classified as text, tables, or figures - Number of documents by type
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office -- Support offices -- Software Process Assurance -- Total hours expended

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Measurement (Cont'd)

Type	Measurement
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate (new, reuse, and total KSLOC or FPs) - Number of design components (screen, object) - Number of design statements, program design language (PDL) statements, and structured narrative statements - Number of pages in design documents - Number of process "bubbles" - Number of data "entities" - Number of boxes or arrows in hierarchical I/O charts - Number of CSCIs, CSC, and CSUs - Number of inputs/outputs - Number of external interfaces - Number of logical files
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from sec 5.2.4

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Completed Software Design Document (SDD), Interface Design Document (IDD), Database Design Document (DBDD)
	Project risks have been identified, documented, and their impact assessed.

5.3.2 Software Design Work Review

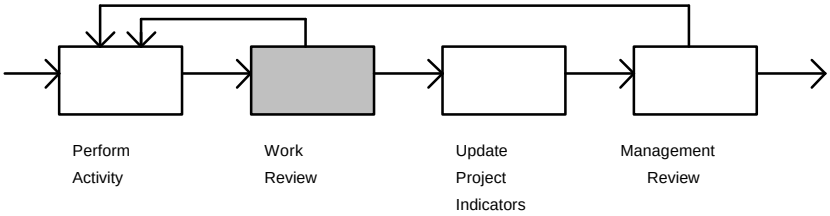
Purpose

The purpose of this review is to ensure that:

1. Appropriate support and system organizations have been identified and given the opportunity to assess the technical content of the software design.
2. Software designs are reviewed for technical content:
   - documented in accordance with SSC policies, procedures, and standards.
   - stated in terms that are complete, consistent, feasible, and testable.
3. The software designs are traceable to the original user's need statement, approved system and software requirements.
4. Technical risks are identified and documented.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software Design Documents	Includes the SDD, IDD, DBDD, updated RTM, SDP and risk analysis document.
Review Questionnaire and/or Checklist	Any questionnaire or checklist tools developed to assist the review process.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Develop and distribute review package.	Appendix A (Page A-10)
Conduct the Review	Review draft documents IAW the SSC Work Review Procedures. Materials to review include: - SDD, IDD, DBDD - Software Test Plans - Verification and validation - Status of the draft documents: -- Updated Software Development Plan (SDP) Ensure software designs are: - documented in accordance with policy and standards. - complete, consistent, unambiguous, feasible and testable. - traceable to the system and software requirements. Ensure the RTM is updated and correct. Identify project risks.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project Risks. - Product defects. - Review action items. - Review minutes. - Review Panel recommendation.	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities in this stage.

Role	Responsibility
Project Office	Presents the software design and associated documents for review.
System OPR	Represents system viewpoint, in review.
Review Panel	Reviews material.
Support OCR's	Support review panel, as needed, on specific items.
Software Process Assurance Group (SPA)	Monitors the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Software Design Document	Software design developed to address software requirement Specifications to include: SDD, DBDD, IDD, and SDP.
Software Test Plan, Software Test Description and Test Cases	All test documentation associated with the project.
Risk Analysis Document	Risks identified during the review.
Defect Report	Defects identified during the review.
Action Items	Action Items taken during the review.
Minutes	Minutes of the review.
Recommendation(s)	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Requirements	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs - Percent/Number of action items open/closed to date - required transaction rate - required response time - required availability - Number of pages of documentation by document name; pages can be classified as text, tables, or figures - Number of documents by type - defects, errors, omissions found during review

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Measurement (Cont't)

Type	Measurement
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office -- Support offices -- Software Process Assurance -- Total hours expended
Size	(Systemity is a determinant of size. At this point, estimate size based on the Number of req'ts) * - Current estimate Function Points * - Number of design components (screen, object) * - Number of design statements, program design language (PDL) statements, and structured narrative statements * - Number of pages in design documents * - Number of process "bubbles" * - Number of data "entities" * - Number of boxes or arrows in hierarchical I/O charts * - Number of CSCIs, CSC, and CSUs * - Number of inputs/outputs * - Number of external interfaces * - Number of logical files
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from sec 5.3.1

Exit Criteria

The software designs have been technically reviewed.

IF Review Panel ...	THEN ...
Approves Technical Content	Project proceeds to the Update Management Indicators stage.
Disapproves Technical Content	The software design and associated documents are recycled to the Software Design Perform stage for further refinement.

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5.3.3 Software Design: Update Project Indicators

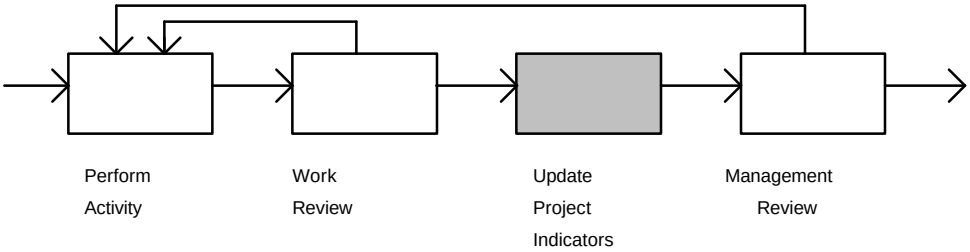
Purpose

The purpose of this process is to:

1. Update project management indicators - Size, Cost, and Schedule.
2. Evaluate project risk and assess impact.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The SDD, IDD, SDP, and DBDD have been reviewed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software Design Documents	Includes the SDD, IDD, DBDD, RTM, SDP.
Estimation Procedures	Current approved SSC estimation procedures.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-48)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities in this stage.

Role	Responsibility
Project Office	Perform activities associated with this stage.
Support Offices	Provide support as requested by Project Office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Size Estimate	Revised Size Estimate
Cost Estimate	Revised Cost Estimate
Schedule Estimate	Revised Schedule Estimate
Risk Analysis Report	Revised Risk Analysis Report

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirements	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs * - Percent/Number of action items open/closed to date * - required transaction rate * - required response time * - required availability * - Number of pages of documentation by document name; pages can be classified as text, tables, or figures * - Number of documents by type
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office -- Support offices
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate in Function Points * - Number of design components (screen, object) * - Number of design statements, program design language (PDL) statements, and structured narrative statements * - Number of pages in design documents * - Number of process "bubbles" * - Number of data "entities" * - Number of boxes or arrows in hierarchical I/O charts * - Number of CSCIs, CSC, and CSUs * - Number of inputs/outputs * - Number of external interfaces * - Number of logical files

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Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from sec 5.3.2

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.
	Project risks have been re-evaluated and their impact assessed.

5.3.4 Software Design: Management Review (Preliminary Design/Critical Design Reviews)

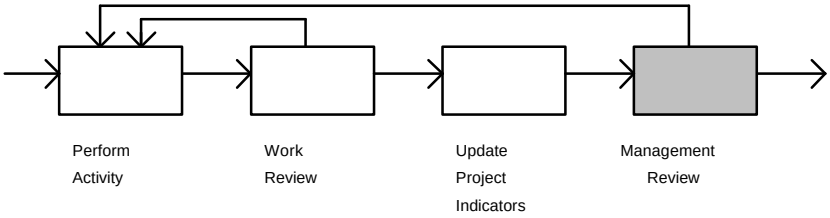
Purpose

The purpose of this review is to:

1. Provide management visibility.
2. Approve/disapprove all software and interface design documents.
3. Review initial project size, cost, and schedule estimate.
4. Review project risk areas.
5. Approve/disapprove continuation of the project.
6. Approve and allocate resources and funding to accomplish the next phase.
7. Establish the provisional baseline for the design.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The SDD, IDD, SDP, and DBDD have been reviewed for technical content.
	Project size, cost, and schedule estimates have been revised based on the software design.
	Project risks have been analyzed and their impact assessed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software Design Documents	Includes: SDD, DBDD, IDD.
Project Plans	All plans associated with the project (i.e. SDP).
Updated Project Estimates	Size, cost, and schedule.
Work Review Minutes	Minutes from the Work Review.
Work Review Action Items	List of all Action Items from the Work Review.
Work Review Recommendation	Recommendation from the Work Review.
Review Questionnaire/ Checklist	Any questionnaire or checklist tools developed to assist the review process.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Develop and distribute review package.	Appendix A (Page A-10)
Conduct the Review	Review documents IAW the SSC Management Review Procedures. Material to review: - Overview of the Software Design. - Overview of Work Review (Action Items, Recommendations). - Revised project estimates. - Status of effort expended to date. - Funding requirements. - Resource Impact and Cost. - Plans to accomplish near-term actions. - SSC manpower requirements; Direct, Support, Overhead, System. Identify project risks. Decisions to make: - baseline software design. - finalize/approve CRLCMP, ILSP, and System Training Plan - approve/disapprove continuation of the project.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project Risks. - Product defects. - Review action items. - Review minutes. - Any changes that need to be made to the baseline must be identified, evaluated, assessed for risk, documented, planned, communicated to the affected groups or individuals and tracked to completion. The changes must be reprocessed through the Needs Analysis phase. - Approval/disapproval decision.	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove.
Project Office	Presents review material to management.
Review Panel	Assist Management in the decision process.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Software Design Documents	SDD, IDD, DBDD, SDP.	F
Approved Updated Project Estimates	Revised size, cost, and schedule estimates.	I
Risk Analysis Document	Management risks identified during the review.	I
Review Defect Report	Defects identified during the review.	I
Review Action Items	Action Items taken during the review.	I
Review Minutes	Minutes of the review.	I
Approval Authority's Continuation Decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	I

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirements	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs - Percent/Number of action items open/closed to date - Number of pages of documentation by document name; pages can be classified as text, tables, or figures
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office prep -- Support offices prep -- Conduct of review -- Total hours
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate in Function Points * - Number of design components (screen, object) * - Number of design statements, program design language (PDL) statements, and structured narrative statements * - Number of pages in design documents * - Number of CSCIs, CSC, and CSUs * - Number of inputs/outputs * - Number of external interfaces * - Number of logical files
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from sec 5.3.3

Exit Criteria

Management has commitment to allocate resources to implement the design. The software designs are baselined. Otherwise, the designs are recycled through the Software Design Perform Activity stage or the project is canceled.

IF Approval Authority ...	THEN ...
Approves Continuation	The project proceeds to the Code and Test process.
Disapproves Continuation	The design and associated material are recycled to the Software Design Perform Activity stage for further refinement.
Cancels Project	Refer to Cancellation process (see Appendix H).

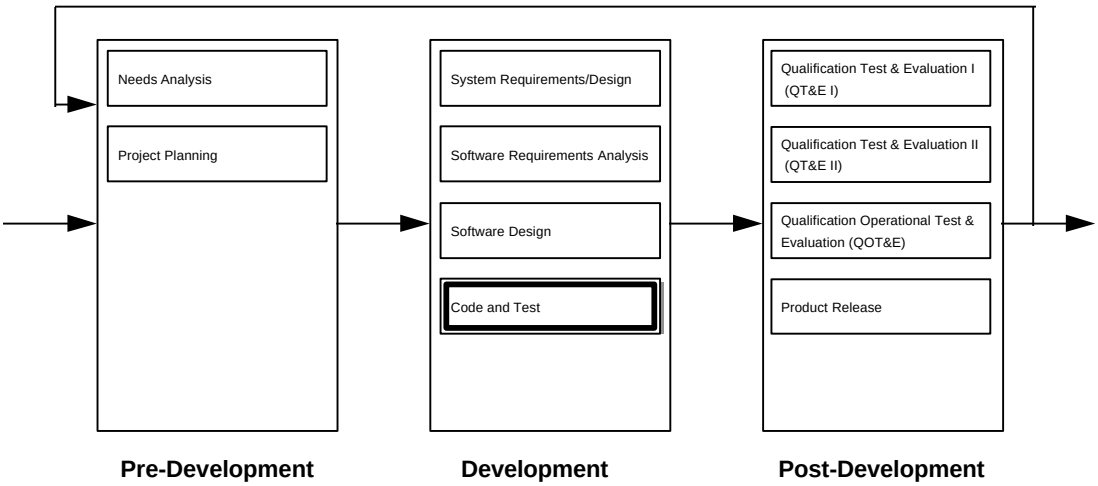
5.4 Code and Test: Overview

Definition

Code and Test is the process where the software design is developed into source code modules, and tested to ensure compliance with the user's system requirements.

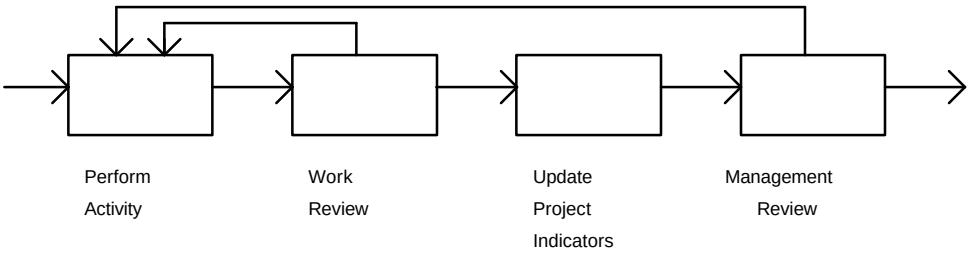
Where We Are

This diagram illustrates where the Code and Test process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete the Code and Test process.



In This Section

The specific Code and Test stages will be covered in the following sections.

Code and Test Stage	Section
Perform Activity	5.4.1
Work Review	5.4.2
Update Project Indicators	5.4.3
Management Review	5.4.4

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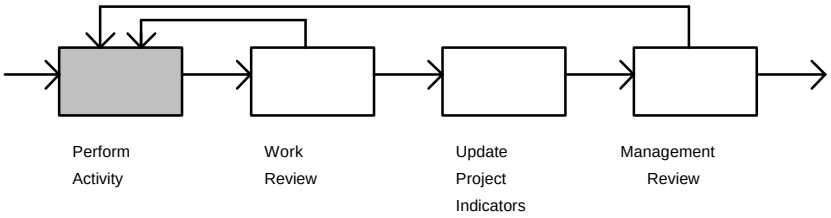
5.4.1 Code and Test: Perform Activity

Purpose

During the perform stage, the software modules are developed and tested.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The software designs have been defined, prioritized, documented, and approved.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software Design Documents	Software design developed to address software requirements to include: -Software Design Document (SDD) -Interface Design Document (IDD) -Software Development Plan (SDP) -Database Design Document (DBDD) -Software Test Plan (STP) -Software Test Descriptions (STD) -Computer Center Software Operator Manual (CCSOM) -Software User Manual (SUM) -Security Document
Requirements Traceability Matrix (RTM)	Matrix allowing the coded products to be traced back to the Software Design Document

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Preparation	Obtain training in Code and Testing Methodology Prepare publication announcement Identify and evaluate reusable code assets	Atch 5.4.1-1 (Page 5-249) Appendix F
Code the Software	Review Design and Requirements Documents Develop the source code Generate executables Reuse code assets	Atch 5.4.1-1 Appendix F
Test the Software	Perform testing IAW Software Test Plans Reuse test assets	Atch 5.4.1-1 Appendix F
Turn-In Preparation	Develop Software Installation Plan (SIP) Establish software and/or documentation baseline. Establish the priority of the release-emergency, block, special. Capture software, required release date, identify sites for QT&E-II. Create release document. Identify the Difficulty Reports, Systems Advisory Notices etc. that are cleared by this release. Collect test data, test scripts, expected outputs etc. required by the software test plan. Collect the software onto magnetic media for transmittal to SSQ.	Atch 6.1.1-1
Formally Document the Software	Update the following: - Software Test Plan - Software Test Description - Computer Center Software Operator Manual - Software User Manual - Requirements Traceability Matrix	 MIL-STD-SDD MIL-STD-SDD MIL-STD-SDD MIL-STD-SDD Atch 5.1.1-1 (Page 5-226)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities in this stage.

Role	Responsibility
Project Office	Responsible for documenting the software design and coordinating with the user and support offices to ensure the design is complete, consistent, and actually reflects the users intention.
Support Offices	Provide support to the project offices as needed (see Appendix E).
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Source Code	Source code captured on appropriate media.
Software Test Plan (STP)	Describes the test approach, identifies the test to be performed, and provides schedules for test activities.
Software Test Description (STD)	Test cases and test procedures necessary to accomplish software testing.
Computer Center Software Operator Manual (CCSOM)	Describes all software operational requirements.
Software User Manual	Instructions for software user.
Software	The executable form of the program.
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent.
Security Certification Letter	An endorsed letter certifying the integrity of the software.
Software Installation Plan	Describes plans for installing software at user sites, training users, and converting from old systems.
Camera ready copy of printed documentation	User and operations manuals or updates, software installation plan, etc. as required.

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Product Summary, Cont'd

Product	Description
Publication Announcement	Announcement of manuals to be published.
Updated Requirements Traceability Matrix (RTM)	Matrix allowing software features to be traced back to system requirement.
Software Development Plan (SDP)	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Requirements	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs - Percent/Number of action items open/closed to date - Number of pages of documentation by document name; pages can be classified as text, tables, or figures
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office -- Support offices -- Software Process Assurance

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Measurement (Cont'd)

Type	Measurement
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate in Function Points * - Number of design components (screen, object) * - Number of design statements, program design language (PDL) statements, and structured narrative statements * - Number of pages in design documents - Number of process "bubbles" - Number of data "entities" * - Number of CSCIs, CSC, and CSUs * - Number of inputs/outputs * - Number of external interfaces * - Number of logical files - Number of source statements (source lines of design), program design language (PDL), and structured narrativestatements - Number of physical and logical lines of code (LOC) - Number of object code instructions - Number of words of memory - Number of screens - Number of operands and operators - Number of algorithms
Defects	- Category of defect (See DOD-STD 2167A, Appendix C) - Defect traceability to a specific stage - Number and type of defects per KSLOC - labor months, labor hours, and/or dollars of inspection/detection cost per defect - average Number of days to fix a defect - Number of tests - Number of test procedure steps - Number of pages of test documentation

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Measurement (Cont'd)

Type	Measurement
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars to date * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from sec 5.3.4

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	The software, test results, STP, and STD have been developed and documented.
	Project risks have been identified, documented, and their impact assessed.
	The software and manuals have been captured, prioritized, and documented.
	A coordination form has been completed and attached to the release package.
	Appropriate materials are ready to be forwarded to testers and editors.
	The software test plan has been executed using the test data and script that will be provided to SSQ.
	Applicable documents are finalized

5.4.2 Code and Test Work Review

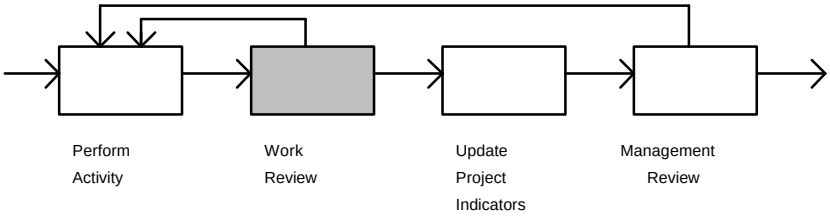
Purpose

The purpose of this review is to ensure that:

1. Appropriate support and system organizations have been identified and given the opportunity to assess the technical content of the source code and associated test plans.
2. Source code and test results are reviewed for technical content: - documented in accordance with SSC policies, procedures, and standards - stated in terms that are complete, consistent, feasible, testable, and usable.
3. Source code and test results are traceable to the original user's requirements, approved system and software requirements, and the approved software design
4. Technical risks are identified and documented.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Code and Test documents	All code and test related documents developed in the previous stage to include: STP, STD, SDP and Risk Analysis Document
Requirements Traceabililty Matrix	Matrix that allows software features to be traced back to the Software Design Document.
User Manuals	All software user manuals to include: CCSOM, and SUM
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Software Test Plan	Provides high-level planning for testing
Software Test Description	Provides test cases/procedures for testing
Policies, Procedures, Standards	All applicable directives that support or constrain the project.
Review Questionnaire/Checklist	Any questionnaire or checklist tools developed to assist the review process.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Develop and distribute review package.	Appendix A (Page A-10)
Conduct the Review	Review draft documents IAW the SSC Work Review Procedures. Materials to review: - Source code and test description/test plans/results - Security requirements - Release Document - Requirements Traceability Matrix - Verification and validation strategy - Updated Software Development Plan Ensure all software is: - developed in accordance with policy and standards - traceable to software design, system and software requirements Ensure the RTM is updated and correct Identify project risks	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project Risks - Product defects - Review action items - Review minutes - Review Panel recommendation	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities in this stage.

Role	Responsibility
Project Office	Presents source Code and Test results for review
System OPR	Represents system viewpoint, in review
Review Panel	Reviews material
Support OCR's	Support review panel, as needed, on specific items
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Code and Test Documents	STD, STP, updated SDP, Risk Analysis Document, Security Document
Review Defect Report	Defects identified during the review.
Review Action Items	Action Items taken during the review.
Review Minutes	Minutes of the review.
Review Recommendations	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Requirements	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs - Percent/Number of action items open/closed to date - Number of pages of documentation by document name; pages can be classified as text, tables, or figures - defects, errors, omissions found during review
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office prep -- Support offices prep -- Conduct of review

continued on next page...

Measurement (Cont'd)

Type	Measurement
Size	- Function Points or KSLOC * - Number of design components (screen, object) * - Number of design statements, program design language (PDL) statements, and structured narrative statements * - Number of pages in design documents * - Number of process "bubbles" * - Number of data "entities" * - Number of CSCIs, CSC, and CSUs * - Number of inputs/outputs * - Number of external interfaces * - Number of logical files * - Number of source statements (source lines of design), program design language (PDL), and structured narrative statements * - Number of physical and logical lines of code (LOC) * - Number of object code instructions * - Number of words of memory * - Number of screens * - Number of operands and operators * - Number of algorithms * - Number and type of defects per KSLOC * - Number of faults relative to security * - Number of major and minor defects (on an ordinary scale) * - labor months, labor hours, and/or dollars of inspection/detection cost per defect * - average Number of days to fix a defect * - amount of code reuse * - Number of tests * - Number of test procedure steps * - Number of pages of test documentation
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from Section 5.4.1

Exit Criteria

The source code, test plans, and test reports have been technically reviewed.

IF Review Panel ...	THEN ...
Approves Technical Content	Project proceeds to the Update Management Indicators stage.
Disapproves Technical Content	The source code, test plans, and test cases are recycled to the Code and Test Perform stage for further refinement.

5.4.3 Code and Test: Update Project Indicators

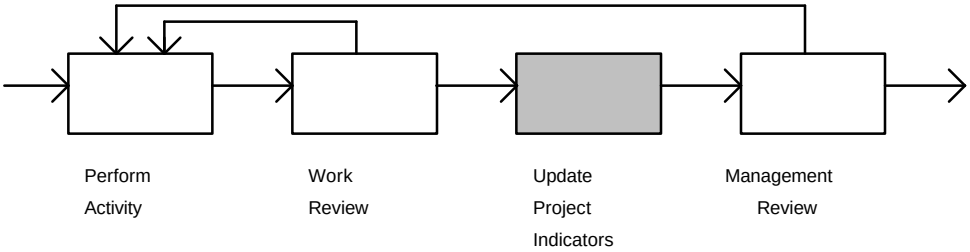
Purpose

The purpose of this process is to:

1. Update project management indicators - Size, Cost, and Schedule
2. Evaluate project risks and assess impact

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The STD and STP have been reviewed for technical completeness.
	Criticality and impact of software/documentation (to be released) is assessed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Code and Test Documents	Source code, STD, STP, RTM, SDP
Release Document	Signed Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Estimation Procedures	Current approved SSC estimation procedures.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-48)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities in this stage.

Role	Responsibility
Project Office	Perform activities associated with this stage.
Support Offices	Provide support as requested by Project Office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Size Estimate	Revised Size Estimate
Cost Estimate	Revised Cost Estimate
Schedule Estimate	Revised Schedule Estimate
Risk Analysis Document	Revised Risk Analysis Document

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirements	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs * - Percent/Number of action items open/closed to date * - Number of pages of documentation by document name; pages can be classified as text, tables, or figures
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office -- Support offices

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Measurement (Cont'd)

Type	Measurement
Size	* - Function Points or KSLOC * - Number of design components (screen, object) * - Number of design statements, program design language (PDL) statements, and structured narrative statements * - Number of pages in design documents * - Number of process "bubbles" * - Number of data "entities" * - Number of CSCIs, CSC, and CSUs * - Number of inputs/outputs * - Number of external interfaces * - Number of logical files * - Number of source statements (source lines of design), program design language (PDL), and structured narrative statements * - Number of physical and logical lines of code (LOC) * - Number of object code instructions * - Number of words of memory * - Number of screens * - Number of operands and operators * - Number of algorithms * - Number and type of defects per KSLOC * - Number of faults relative to security * - Number of major and minor defects (on an ordinary scale) * - labor months, labor hours, and/or dollars of inspection/detection cost per defect * - average Number of days to fix a defect * - amount of code reuse * - Number of tests * - Number of test procedure steps * - Number of pages of test documentation
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from sec 5.4.2

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.
	Project risks have been re-evaluated and their impact assessed.

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5.4.4 Code and Test: Management Review (Test Readiness Review)

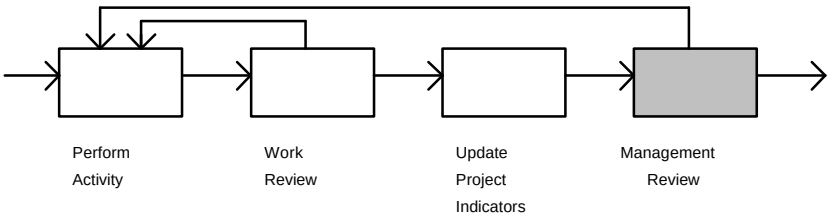
Purpose

The purpose of this review is to:

1. Provide management visibility
2. Approve/disapprove the software
3. Review revised project size, cost, and schedule estimate
4. Review project risk areas
5. Approve/disapprove continuation of the project
6. Approve and allocate resources and funding to accomplish the next phase
7. Approve the Product Baseline

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The software, Software Test Plan (STP), and Software Test Descriptions (STD) have been completed and reviewed.
	Project size, cost, and schedule estimates have been revised.
	Project risks have been analyzed and their impact assessed.
	System testing has been completed by the development office.
	The software and documentation have been baselined.
	The developer and the functional users are satisfied that the application meets the requirements identified at the inception of the project.
	Any waivers to product standards have been approved.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Source Code	Source code
Software Development Plan	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.
Requirements Traceability Matrix	Matrix allowing software features to be traced back to system requirement.
Software Test Plan	Module test plan
Software User Manual	Provides instructions on how to operate the system
Software Installation Plan	Describes plans for installing software at user sites, training users, and converting from old systems.
Files List	List of all files to be included in release
Updated Project Estimates	Size, Cost, and Schedule
Work Review Minutes	Minutes from the Work Review.
Work Review Action Items	List of all Action Items from the Work Review.
Work Review Recommendation	Recommendation from the Work Review.
Review Questionnaire/ Checklist	Any questionnaire or checklist tools developed to assist the review process.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Develop and distribute review package Review requirements for conducting a Test Readiness Review (See TRR Question Set)	Appendix A (Page A-10) Atch 5.4.1-1 (Page 5-249)
Conduct the Review	Review documents IAW the SSC Management Review Procedures. Materials to review include: - Overview of the software and test plan Document - Overview of Work Review (Action Items, Recommendations) - Revised estimates - Status of effort expended to date - Funding requirements - Resource Impact and Cost - Plans to accomplish near-term actions - SSC manpower requirements; Direct, Support, Overhead, System Identify project risks Decisions to make: - baseline software and test plans - approve/disapprove continuation of the project	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project Risks - Product defects - Review action items - Review minutes - Any changes that need to be made to the baseline must be identified, evaluated, assessed for risk, documented, planned, communicated to the affected groups or individuals and tracked to completion. The changes must be reprocessed through the Needs Analysis phase. - Approval/disapproval decision	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove
Project Office	Presents review material to management
Review Panel	Assist Management in the decision process
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Source Code, STP, STD, SDP	Becomes the product baseline.	F
Approved Updated Project Estimates	Revised size, cost, and schedule estimates	I
Risk Analysis Document	Management risks identified during the review	I
Review Defect Report	Defects identified during the review.	I
Review Action Items	Action Items taken during the review.	I
Review Minutes	Minutes of the review.	I
Approval Authority's Continuation Decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	I

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs * - Percent/Number of action items open/closed to date * - Number of pages of documentation by document name; pages can be classified as text, tables, or figures
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office -- Support offices -- Review time
Size	* - Function Points or KSLOC * - Number of design components (screen, object) * - Number of design statements, program design language (PDL) statements, and structured narrative statements * - Number of pages in documents * - Number of process "bubbles" * - Number of data "entities" * - Number of CSCIs, CSC, and CSUs * - Number of inputs/outputs * - Number of external interfaces * - Number of logical files * - Number of source statements (source lines of design), program design language (PDL), and structured narrative statements * - Number of physical and logical lines of code (LOC) * - Number of object code instructions * - Number of words of memory

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Measurement (Cont'd)

Type	Measurement
Size (Cont'd)	* - Number of screens * - Number of operands and operators * - Number of algorithms * - Number and type of defects per KSLOC * - Number of faults relative to security * - Number of major and minor defects (on an ordinary scale) * - labor months, labor hours, and/or dollars of inspection/detection cost per defect * - average Number of days to fix a defect * - amount of code reuse * - Number of tests * - Number of test procedure steps
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars to date * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from sec 5.4.3

Exit Criteria

Management has commitment to allocate resources to test the software. The software and test plans are baselined. Otherwise, the software and test plans are recycled through the Code and Test Perform Activity stage or the project is canceled.

IF Approval Authority ...	THEN ...
Approves Continuation	The project proceeds into the turn-in activity for independent testing.
Disapproves Continuation	The requirements package is recycled to the Code and Test Perform Activity stage for further refinement.
Cancels Project	Refer to Cancellation process (see Appendix H).

Attachments

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Atch 5.1.1-1
System Requirements and Analysis Procedures

	Obtain training on requirements analysis
	Ensure the requirement team is knowledgeable in the requirement gathering process(es).
	Ensure the requirement team is familiar with the requirement analysis methodology and the tool usage if applicable.
	If the personnel are inexperience in either area, arrange to provide proper training to those who need it by contacting the Directorate of Professional Development.

	Review existing documentation/software
	Review the approved Software development plan , Operational Concept document and any existing documentation.
	Gather and record any reuse opportunities within the domain. The data gathered during this process forms the basis for identifying areas within the domain where reuse can be most effectively implemented.

	Identify and Evaluate Reusable System Requirements
	Search the Air Force Defense Software Repository System (AFDSRS) similar software (see Appendix F)
	Evaluate the identified reusable requirements assets to determine its suitability.

	Specify the requirements for the System or a Segment of the System

	STEP ONE: Review the System/Segment Specifications Data Item Description (DID) and understand the requirements for completion. A quick list of requirements as extracted from the DID follows. Each number corresponds to a number in the DID.
	3.1 Definition. Briefly describe the system and provide a high level system architecture diagram. Address operational, interface, and logistical considerations and concepts. Address if the system must operate in more than one state or mode such as idle, ready, active, post-use analysis, training, degraded, emergency, backup, wartime, peacetime.
	3.2 Describe system characteristics such as:
	3.2.1 Performance
	3.2.2 Database requirements and names that must be incorporated into the system, including data elements, characteristics, relationships and storage capacity.
	3.2.3 External interface requirements including

continued on next page ...

	3.2.3.1 External interface name and physical interface requirements, communication/data transfer requirements, nature of inputs and outputs, security or privacy requirements.
	3.2.4 Physical characteristics such as weight limits, etc.
	3.2.5 System quality factors including:
	3.2.5.1 Reliability
	3.2.5.2 Maintainability
	3.2.5.3 Availability
	3.2.6 Environmental requirements specifying any requirements concerning the environment within which the system is required to operate.
	3.2.7 Transportability (special requirements for transportation and handling)
	3.2.8 Flexibility and expansion
	3.2.9 Portability (special requirements for employment, deployment, rehosting)
	3.3 Specify any minimum design and construction standards including:
	3.3.1 Materials
	3.3.2 Electromagnetic radiation
	3.3.3 Nameplates and product marking
	3.3.4 Workmanship
	3.3.5 Interchangeability
	3.3.6 Safety
	3.3.7 Human engineering
	3.3.8 Nuclear control
	3.3.9 System security and privacy
	3.3.10 Government furnished property usage.
	3.3.11 Computer resource reserve capacity.
	3.4 Specify requirements for system documentation such as specifications, drawings, technical manuals, test plans and procedures, and installation instruction data.
	3.5 Specify any logistic considerations and conditions that apply to the operational requirements.
	3.6 Specify any requirements for personnel and training.
	3.7 Identify and describe each segment of the system and the relationships among the segments.
	3.8 Specify any order of precedence or assigned weights indicating the relative importance of the requirements.
	4. Define a set of qualification methods to be used to ensure each requirement in Sections 3 and 5 has been met.
	4.1 Qualification methods may include: Demonstration; Test; Analysis; Inspection. 4.2 Specify special tests required for sampling.
	5. Specify requirements for the preparation of the system and all its components for delivery, including packaging and handling.
	STEP TWO: Gather and review all documentation previously drafted which might provide insights for this procedure. This includes at the very least the Software Development Plan (SDP), and the Operational Concept Document (OCD) or Operational Requirements Document (ORD). From these documents, extract all those items that can be used to draft the SSS.

Atch 5.1.1-1, Continued
System Requirements and Analysis Procedures

	Develop Interface Requirements Agreement (IRA)
	Establish an Interface Control Working Group (ICWG).
	Develop a charter (Figure 5.1.1-1), which contains instructions on how to establish and conduct an ICWG.
	Once the ICWG is established, call a meeting for all to attend; the agenda for this meeting will be to discuss the development or re-engineering effort.
	- Complete a system interface worksheet for each system that you interface with (Figure 5.1.1-2).
	Established an IRA for each system that your system will interface with (including legacy systems). See instructions for completing an IRA at Figure 5.1.1-3.
	Create an interface status matrix chart/slide (Figure 5.1.1-4) to brief at each formal review. - List the activities required to draft and formalize the IRA across the top of the matrix. - Enter a check mark in the appropriate box for each completed activity. - Indicate overall status of an activity in the last column; consider using the letters and colors G (green), Y (yellow), or R (red) with an up/down arrow in the appropriate box.
	A sample of how the ICWG fits into the overall interface requirements process is at Figure 5.1.1-5.
	Once the IRA is signed by each ADS manager, it forms the basis for the Interface Requirements Specifications (IRS), which is baselined at the SSR.

	Develop Requirements Traceability Matrix
	Review the requirements traceability matrix created in the System Requirements Phase and make the updates identified in the Software Design Document

Figure 5.1.1-1
Interface Control Work Group (ICWG) Charter (Sample)

S[ADS Name]

The [ADS Name] ICWG serves as the official communications link between program participants to resolve interface problems, document interface agreements, and coordinate Engineering Change Proposals. The ICWG is established to review, analyze, and evaluate interface requirements, which may impact particular aspects of the [ADS Name] software development effort.

1. Authority. General authority for forming an ICWG is contained in MIL-STD-493A. Formation of [ADS Name] ICWG is directed by the Communications-computer Systems Program Plan for the [ADS Name].

2. Organization. ICWG membership will consist of one member from each of the contractors and representation from each automated data system (ADS) that interfaces with [ADS Name]. A roster of all agencies represented on the ICWG will be maintained by the ADS Program Manager and will be provided to all participants. The ICWG will be chaired by the [ADS Name] Program Manager.

3. Interface Requirement Agreement (IRA). An IRA is an agreement between [ADS Name] and an external ADS that documents the interface data requirements between the two systems. The IRA must be written in sufficient detail to convey to the developer exactly what data, in what format, and how often the systems need to interface. IRAs will be scheduled for completion, released by the originating agency, signed by the interfacing participants, and approved by the ICWG chairperson prior to the time of the applicable design review.

4. Responsibilities. The participating contractors and the [ADS Name] Program Management Office will have collateral responsibilities where required.

a. Duties of the Chairperson. The chairperson shall:
   1. Serve as the ICWG's voice for the [ADS Name] program management staff on interface or integration matters.
   2. Coordinate with other [ADS Name] working groups as necessary.
   3. Have the authority to delegate to a Co-Chairperson or Recorder.

b. Member Duties.
   1. Serve as their organizations' or ADS' primary point of contact on interface matters.
   2. Assist in the preparation and review of the IRA for the [ADS Name] Program.
   3. Brief their organizations' interface issues and concerns to the ICWG as necessary.
   4. Ensure that their organizations are fully aware of any [ADS Name] requirements that may impact the organization.

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Figure 5.1.1-1 Continued

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5. Respond to action items assigned during ICWGs.
6. Submit proposed agenda items to the ICWG Secretariat.
7. Coordinate on IRAs applicable to their organization.

c. Secretariat Duties.

1. Notify members of date, time, location, and intended purpose of all ICWG meetings scheduled by the ICWG Chairperson.
2. Ensure minutes are taken and verify their accuracy. Prepare, publish and distribute the minutes of the ICWG.
3. Serve as the membership's primary point of contact for monitoring action items and passing recommendations to the program office.
4. Schedule ICWG meetings as required to revise IRAs or provide technical advice.
5. Establish agenda for meetings based on recommendations from members.
6. Prepare, publish, distribute, and update the ICWG charter.

5. Procedures. ICWG meetings will be held annually or at the call of the ICWG chairperson. The chairperson can convene meetings with selected ICWG members to discuss individual ADS interfaces. ICWG members may requires a meeting by submitting proposed agenda items to the ICWG chairperson. Each organization will plan and fund for their participation at the meeting.

6. Action Items. The chairperson is responsible for documenting all action items, the organizations affected by the action items, and point of contact for the resolution of action items. The chairperson is responsible for ensuring that the action items are brought to the attention of the responsible parties and that a resolution is achieved that does not adversely affect the cost, schedule, or performance of the [ADS Name] modernization program.

7. The ICWG members are listed at Attachment X. Any changes to the ICWG membership should be forwarded to the ADS Program Manager 7 days prior to the effective date of the change.

Figure 5.1.1-2

System Interface Worksheet (Sample)

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1. System Name: [The name of the system with which your system will interface.]

2. System Code: [This is the code used to identify the system; an example is GV, the system designation for SBSS.]

3. Point of Contact (POC): [Record the name, address (both mailing and E-mail), organization, telephone and FAX numbers of the ICWG point of contact. As a minimum, this information should be gathered for the ADS manager.]

4. System Security: [Record the highest security classification and level of the system.]

5. Platform: [Describe the hardware platform supporting the ADS; examples are Unisys 2200 and Sun Workstations.]

6. Platform Configuration: [Describe the configuration of the system; examples are stand-alone, mainframe, workstations on a LAN.]

7. Operating System: [Record the type of operating system; examples are DOS, UNIX, SCO UNIX, and VMS. This information determines which conversions may be required on the exchanged data.]

8. Interface Message(s): [Record the message name(s)and direction of interface. Example: AFC2S-LOGPLAN INCOMING; MDS-PDS OUTGOING.]

Figure 5.1.1-3
Developing an Interface Requirements Agreement (Sample)

The Problem Domain Experts (PDEs), in concert with the ICWG, draft the IRAs. The information from the draft IRAs are incorporated in the Software Requirements Specification as external interface requirements and are reviewed during the technical review for the SDR. The following is the minimum information required for developing software for external interfaces:

A. Automated Data Systems (ADS) Information.

1. System Name: The name of the system with which your system will interface.
2. System Code: This is the code used to identify the system; an example is GV, the system designation for SBSS.
3. Point of Contact (POC): Record the name, address (both mailing and E-mail), organization, telephone and FAX numbers of the prime point of contact. As a minimum, this information should be gathered for the ADS manager.
4. System Security: Record the highest security classification and level of the system with which your system will interface.
5. Platform: Describe the hardware platform supporting the ADS; examples are Unisys 2200 and Sun Workstations.
6. Platform Configuration: Describe the configuration to the system; examples are stand-alone, mainframe, workstations on a LAN.
7. Operating System: Record the type of operating system; examples are DOS, UNIX, SCO UNIX, and VMS. Also include the version of the operating system. This information determines which conversions may be required on the exchanged data.
8. Interface Message(s): Record the message name(s)and direction of interface. Example:

AFC2S-LOGPLAN	INCOMING
MDS-PDS	OUTGOING

9. Interface Methods: Describe how the systems will communicate including any variables which may exist or alternate capabilities which may be used. Describe back-up and/or recovery procedures. Possible interface method levels are: air gap, electronic file transfer, and Electronic Data Transfer.

   (a) For any method of communication, record the following:

   (1) Sending (source) directory and file name.

   (2) Sending (source) file physical location.

   (3) Receiving (destination) directory and file name.

   (4) Receiving (destination) file physical location.

   (5) File type (Binary, ASCII, EBCDIC).

   (6) File size (maximum).

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continued on next page...

Figure 5.1.1-3, Continued

(7) File size (average).

(8) Time constraints (Routine, Priority).

(9) Transfer media (Defense Data Network [DDN], Modem, Defense Switched Network [DSN], Air Gap).

(b) For electronic methods, record the following:

(1) Protocol (TCP/IP, GOSIP, KERMIT).

(2) Security requirements/constraints.

(3) Source machine Internet address.

(4) Destination machine Internet address.

(5) System sign-on and password procedures. Discuss how the sign-on and password procedures are obtained.

(6) Disk permanent file name (PFN). If the interface is accomplished using a disk file, record the PFN of the file, the owner identity (ID), and the device set for the file used.

(c) For EDI record the formatting standard to be used (X12, other).

(d) For air gap method record the following:

(1) Diskette size (5.25, 3.50).

(2) Diskette density (low, high).

(3) Diskette format (DOS, UNIX).

(4) Tape type (cartridge, cassette).

(5) Type size (9", 8 mm).

(6) Tape blocking factor. The number of records on a block.

B. Message Information.

1. Message Name.
2. Purpose of Message.
3. Security Classification.
4. File Export Format.
5. Communication Method(s).
6. Message Creation Trigger.
7. Message file name (include full path).
8. Interface Procedures.
9. Receiving System's Directory.
10. Sending System's Directory.

continued on next page...

Figure 5.1.1-3, Continued

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11. Message Content.
    (a) Header Record Information.
        (1) Message Producer's ADS code.
        (2) Message Identifier Number.
        (3) Message Version Date.
        (4) Message Title.
        (5) Number of Images Sent.
        (6) Sending organization
        (7) Receiving organization
12. Detail Message Data.
    (a) Sequence of Message Data.
    (b) Record Structure and Data Elements for Each Record.
        (1) Column Position of Data Elements in the Record.
        (2) Data Element Name.
        (3) Data Element Size.
        (4) Data Element Type.
        (5) Edits (optional).
13. Trailer Record. This will be a way of signifying the end of a particular message.
14. Message Services and Responsibilities. When a message reaches its destination, it should have a particular service or responsibility. For example, incoming messages could apply to the data base or generate a report.

C. ADS responsibilities in relation to support for testing of the interface. Include the projected date of the interface test, and any responsibilities the ADS may have in testing the interface. Quarter and year are acceptable for the IRAs. A memo must be signed later to specify a testing date. Examples of an ADS responsibilities are: providing test data across the interface (for incoming data), and providing verification of test results (for outgoing data). Document the responsibilities for both interfacing systems.

D. Points of Disagreement.

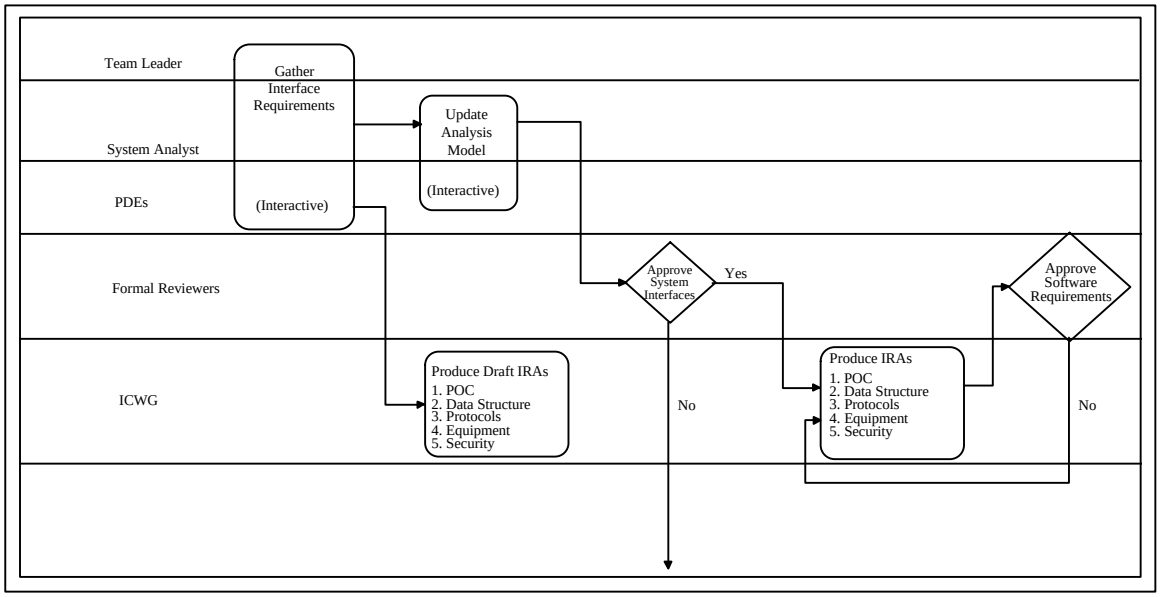
E. Signatures. For the IRA to be official, it must bear the signatures of both ADS representatives.

Figure 5.1.1-4
Data Interface Status Chart

INTERFACES	DEFINE REQUIREMENT	MODEL SYSTEM	NEW DATA DEFINED	MEET WITH OPR	DRAFT DATA ELEMENTS	DRAFT META-DATA	DEFINE STRUCTURE	SYNC SCHEDULE	IRA SIGNED	DOCUMENT INTERFACE	ASSESSMENT

▲ IMPROVING ▼ WORSENING G SATISFACTORY Y MARGINAL R UNSATISFACTORY

Figure 5.1.1-5
Interface/ICWG Requirements Process Chart



Development:	Interface/ICWG Requirements Process Chart

Atch 5.1.1-1, Continued
System Requirements and Analysis Procedures

	System/Segment Design
	Step One: Review the System Software Design Document Data Item Description in MIL-STD-SDD for detailed requirements for completion. A quick checklist of requirements follows (numbering corresponds to the DID numbering).
	1.2 Provide a System overview.
	3. Provide a System/segment behavioral design.
	- describe design decisions such as:
	-- allowed/expected inputs/operations;
	-- planned behavior in response to each of the above;
	-- displays, reports
	-- databases
	-- flexibility and the levels of availability, integrity, and confidentiality.
	4. Describe the system architecture.
	- describe internal structure.
	- identify the segments, Hardware Configuration Items (HWCI), and Communications-Computer System Configuration Items (CSCI); the relationships among the segments.
	- identify a high-level description of each external interface of the system.
	5. Identify the system/segment requirements allocated to each HWCI, CSCI and manual operation.
	6. Describe the system's processing resources including memory size; word size; processing speed; character set standard; instruction set architecture; interrupt capabilities, direct memory access; channels and channel capacities; auxiliary storage capacities; growth capabilities, diagnostic capabilities; and additional hardware capabilities, allocation of pertinent processing resources to each CSCI.
	7. Develop the Requirements Traceability Matrix (see Atch 5.4.2-1).
	Step Two: Gather and review all documentation previously drafted which might provide insights for this procedure. This includes at the very least the Software Development Plan (SDP); the Operational Concept Document (OCD) or Operational Requirements Document (ORD) if following DoD Instruction 5000.2; the System/Segment Specification (SSS); the Software Requirements Specification (SRS); the Interface Requirements Document (IRS); or any consolidated documents that may have been required previously. Extract any information from the above documents that can be used to draft the SSDD.

Atch 5.2.1-1
Software Requirements Analysis Procedures

	Obtain training on requirements analysis
	Ensure the requirement team is trained in requirement analysis methodology(ies).
	Ensure the requirement team is knowledgeable in the selected requirement analysis methodology and tools usage if applicable .
	If the personnel are inexperience in either area, arrange to provide proper training to those who need it by contacting the Directorate of Professional Development.

	Review system requirements
	Review the approved System Segment Specifications , Interface Requirement Agreement.

Ref(s): Additional reading: Alan M. Davis, <u>Software Requirements Analysis & Specification</u>, Prentise Hall, 1990.

	Develop the Software Requirements Specification (SRS)
	STEP ONE: Review the requirements. A brief checklist follows:
	1. Define the computer software configuration item (CSCI). Each CSCI should have an SRS. In defining the CSCIs, include those characteristics that are a condition for its acceptance; defer to design documents those characteristics that the customer is willing to leave up to the developer.
	2. Identify each required CSCI-external interface and specify the CSCI requirements associated with each interface. The Interface Requirements Specification (IRS) may be referenced
	3. Itemize the requirements associated with each capability, function, subject or object of the CSCI. Ensure each requirement is stated that an objective test can be defined for it. Include the following:
	3.1 Response times, sequencing, accuracy, capabities, priorities, continuous operation requirements and allowable deviations.
	4. Identify an requirements imposed on the interfaces between the capabilities identified above.
	5. Specify any requirements imposed on the data elements internal to the CSCI.
	6. Specify any adaptation requirements for the CSCI.
	6.1 Describe any site-unique data required by each installation.
	6.2 Describe any parameters required by the CSCI that may vary within a specified range according to operational needs.
	7. Specify CSCI sizing and timing requirements
	8. Specify any safety requirements applicable to the CSCI
	9. Specify any CSCI requirements concerned with security and privacy.
	10. Specify any other requirements that constrain the CSCI design.
	11. Specify any software quality factors and the method to determine whether each has been met, including: reliability, maintainability, availability, flexibility, portability, reusability, testability, usability, and other attributes.

continued on next page ...

Atch 5.2.1-1, Continued
Software Requirements Analysis

	12. Specify any human factors engineering requirements.
	13. Update the Requirements Traceability Matrix developed previously.
	14. Define a set of qualification methods to ensure each requirement noted above has been met. Qualification methods include: demonstration; test; analysis; inspection.
	STEP TWO: Review all the DIDs that have been developed previously. Particular attention should be given to the Operational Concepts Document (OCD) for it is here that the SRS originates--corresponding SRS requirements can be found in the OCD. For example, the capabilities and functions specified in the OCD chapter on "Capabilities/functions of the new or modified system" should be adequately detailed to extract CSCI definitions (Step One paragraph 1 above). "The SRS contains a complete description of the external behavior of the software system."
	STEP THREE: Develop the SRS.
	1. Purpose of an SRS is to: 1) communicate how the system will look to the system's environment or the user; 2) serve as the basis for system testing and verification activities; and 3) help control the evolution of the software system.
	2. Not included in an SRS are project administrative requirements; designs (which optimizes the requirements/analysis phase); and product assurance plans.
	3. Include behavioral requirements of what the system does and non behavioral requirements of the attributes of the system as it performs its job.
	3.1 Behavioral requirements define precisely what inputs are expected by the software, what outputs will be generated by the software, and the details of relationships that exist between those inputs and outputs.

	Develop the Interface Requirements Specifications (IRS)
	Include all data from the approved and signed IRAs into the IRS
	Incorporate security requirements
	Negotiate testing with all applicable ICWG members for all interfaces. NOTE: Test as many functions as possible and as early as possible to prevent unforeseen problems later in the development

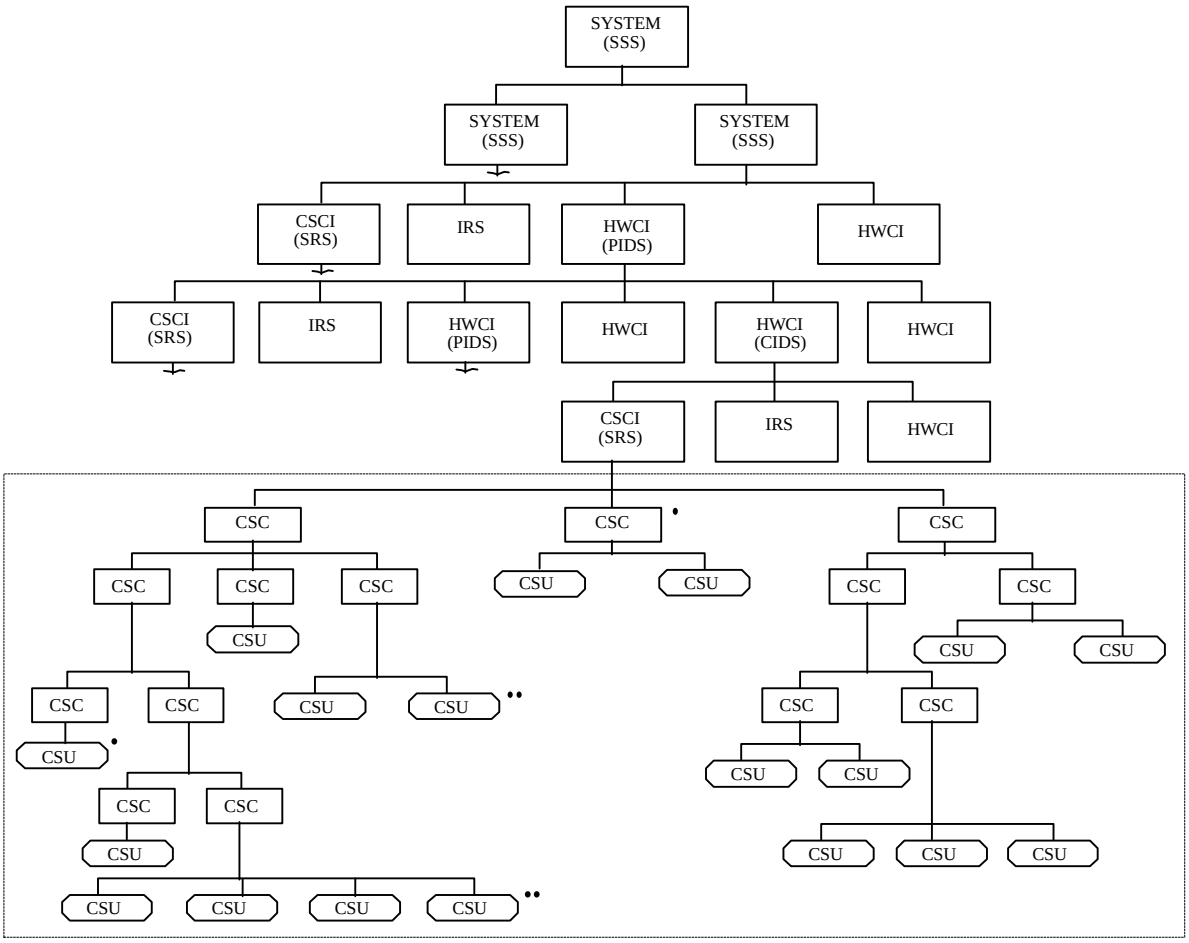
	Update Requirements Traceability Matrix
	Review the requirements traceability matrix created in the System Requirements Phrase and make the updates identified in the Software Requirement Document and the Interface Requirement Document accordingly.

Atch 5.3.1-1
Software Design Procedures

	Review System and Software Requirements Documents
	Determine if there have been any major changes in the System and Software Requirements Documents.
	If there are changes, determine if the changes impact the software design schedule.
	Ensure that changes to the system and software requirements are complete, consistent, unambiguous, feasible, and testable.
	Ensure all changes are traceable to the requirements documents.
	Identify any risks that might impact the design.

	Architectural Design (High Level)
	If applicable, create a graphical hierarchy system breakdown and CSCI decomposition chart (Figure 5.3.1-1)
	Show the relationship between the CSCI and other configuration items in the system.
	If applicable:
	Label each software unit and briefly state its purpose.
	Show the flow of execution control among software units.
	Show method of sequence control.
	Show logic and input conditions such as timing variations, timing relationships between interrupt or sensing operations, and priority assignments.
	Show flow of control for exceptions and other error detection recovery features.
	Show flow of control between concurrently executing processes
	Show the flow of data among software units.
	Identify any non-developmental software to be incorporated into the CSCI.
	Identify the allocation of memory and processing time to each software unit; consider creating a memory/processing time table.

Figure 5.3.1-1
Graphical Hierachy Chart



• **NON-DEVELOPMENTAL SOFTWARE**
•• **SAME CSU USED BY DIFFERENT CSCs**

<u>Example of a system breakdown and CSCI decomposition.</u>

Atch 5.3.1-1, Continued
Software Design Procedures

Ref(s): Data Base Design Document, Data Item Description

	Data Base Design
	ENVIRONMENT:
	Identity all systems that will use this database, including ADS system code
	Estimate internal and peripheral storage requirements for the database.
	Identify multiple storage requirements for distributed processing, if applicable.
	Consider differences in modes of operation following emergencies or disasters, or during deployments.
	Map the components of the database to one another and to the files on which they will be recorded.
	Describe the data communications environment in which the database will be installed, ie, consider if the data base will be installed on a single platform, multi-platforms, or whether data will be shared.
	LABELING: Describe internal labeling conventions.
	ORGANIZATION:
	Describe any major design considerations for the organization of the database.
	Describe the conceptual model used for the database--use an entity-relationship diagram. **(See attached sample)**
	Provide information needed to ensure consistency of design concerning the organization and manipulation of the **physical** database areas/files.
	Provide the following information for each area/file;
	General design and format
	Rationale for the design
	Inter-area/file dependencies
	SPECIAL INSTRUCTIONS:
	Provide instructions to be followed by personnel who will contribute to the generation of the data base and who will use it for testing and operational purposes.
	SUPPORT SOFTWARE/UTILITIES:
	Identify and briefly discuss the support software directly related to the data base, such as:
	Database analysis software for reorganizing or changing the data
	Database sizing software or initializing of resizing the database
	Database loading software for moving or copying data
	Database repairing software.
	SYSTEM INFORMATION:
	Identify the Data base Management System (DBMS) to be used, and the vendor, version or release, and targeted hardware of the DBMS
	Describe the use and management of integrity and access controls that apply to all data base components, such as schema, subschemas, areas of physical files, records or tables, sets or relations, and data elements

continued on next page ...

Atch 5.3.1-1, Continued
Software Design Procedures

	SCHEMA INFORMATION:
	Describe the overall structure to be reflected in the schema or global definition of the database.
	Describe the schema and each subschema of the database. Describe the content of the database, listing its data elements and indication within which subschemas of the database they are visible.
	Describe and depict in a chart the **logical organization** of the data into records, tuples (row), sets, or predefined relationships.
	Describe and depict in a chart the physical structure (ie, areas/files, indexed, pointers) of the logical components of the data base.
	Include sizing formulas for determining the storage required to support the database content and associated software
	Describe the method for recovery or re-creation of the schema and support files
	AREA\FILE INFORMATION:
	Describe the content of each area/file, listing the records it contains and explaining their purposes.
	Describe each area/file, including name, type, code, mapping, limitations and controls, access procedures and mechanisms, and training or testing capabilities
	Provide information about data storage and any limiting factors, such as allocation parameters and methodology, etc.

Atch 5.3.1-1, Continued
Software Design Procedures

Ref(s): AFM 171-100, Vol I; Technical Architecture Framework for Information Management (TAFIM) and SSCR 700-10, Graphical User Interface Standard; AFR 205-16 and SSCR 205-16; Software Design Document

	Detailed Design (Software Sub-component)
	Review the Software Interface Documents for all systems that will interface with this CSCI.
	Provide a design description of each software unit of the CSCI, using diagrams, tables, flow charts, or a program design language.
	Review AFM 171-100 or other applicable references for standard charting symbols.
	Review TAFIM for standard data displays and manipulation if applicable.
	Review TAFIM, Volumes 1-8 as follows: - Overview, Version 2.0, 1 Nov 93 - Technical Reference Model and Standards Profile Summary, Version 2.0, 1 Nov 93 - Architecture Concepts and Design Guidance, Version 2.0, 1 Nov 93 - Standards Based Architecture Planning Guide, Version 2.0, 20 Oct 93 - Acquisition of IT and IM Products Support Plan (currently being written) - Department of Defense (DoD) Goal Security Architecture (DGSA), Version 1.0, 1 Aug 93 - Information Technology Standards Guidance for An Open System Environment (ITSG_OSE) DRAFT - Department of Defense HCI Style Guide, Version 3.0, 30 Sep 93
	Review AFR 205-16 and SSCR 205-16 for Communications-Computer security procedures and responsibilities, if applicable
	Describe each ***software unit*** by name and a project-unique identifier.
	Describe the purpose of the software unit.
	Identify the requirements allocated to the software unit from the software requirements specification.
	List and describe algorithms to be incorporated into the software unit.
	List and explain any constraints, limitations, or unusual features in the design.
	Specify the programming language to be used and rationale or policy for its use.
	Use AFM 171-100, Vol I, Section 7 for standard software languages, if necessary.
	Identify what software units, if any, will be implemented with existing reusable software.
	Provide the identifier of the reusable software, the software library where it resides, and its associated design document.
	If software from this design will be reused, identify the program library where the software will be placed.
	Identify all inputs, outputs, and other data elements of the software unit, including as applicable: - Accuracy and priority
	- Precision/resolution in terms of significant digits
	- Frequency with which the data element is input, calculated, refreshed, or output such as 10 Khz, 50 Msec, etc.
	- Legality checks to be performed on the data element
	- Data type such as integer, ASCII, fixed, real, enumeration, etc.
	- Data representation/format/structure
	- Sources, including other software units where the data element is set or calculated
	- Destinations, including other software elements where the software is used
	- Maximum size and storage needs
	- Access methods, such as random, direct, or sequential

Development:	Software Design Procedures

Atch 5.3.1-1, Continued
Software Design Procedures

	The logic flow to be used by the software unit including: - Conditions under which software unit execution is initiated
	- Conditions under which control is passed to other software units
	- Response and response time to each input, including data conversion, renaming, and data transfer operations
	- Dynamically controlled sequencing during the software unit's operation, including:
	-- The method for sequence control
	-- The logic and input of that method, such as timing variations, priority assignments
	-- Data transfer in and out of memory
	-- The sensing of discrete input signals, and timing relationships between interrupt operations within the software unit
	Use AFM 171-100, Vol I, Section 9 for standard output products

	Design Interfaces(s)
	Refer to the Interface Design Document, Data Item Description**.**

	Develop Design Prototypes
	Create routines using a program design language or code, to test specific, complex design areas that may have a high risk impact on overall design/schedule
	Employ tools that can provide the user an advance view of how screen displays will look
	Consider all allowable hardware and software configurations

	Periodically Review and Inspect the Design
	Setup internal workshops to perform informal, structured walk-throughs and reviews to verify the design is traceable to the System and Software requirements

	Perform Structured Walk-through of the Design
	Ground Rules:
	- Goal is to produce efficient code which is modifiable and maintainable
	- Held in private and no participant will discuss the proceedings to any non-participant
	- Critique the logic, not the person or the personality
	- Each technician will have their work critiqued; thus every technician will both receive and give criticism
	- Each originator of logic must feel free to discuss weaknesses and ask advice
	Procedures:
	- When each item (module, subsystem, program, routine, etc.) is completed, the lead programmer will designate two people to participate in a design walk-through
	- Select a private location free from interruptions
	- Invite the functional analyst, depending on the size or complexity of the item
	- The lead programmer will provide copies of each item 2 - 3 days prior to the walk-through
	- The programmer will fully describe the logic, code, or documentation in great detail to ensure the participants understand it's rationale

continued on next page...

	- Listen and offer alternatives if the alternatives are better in some way such as speed, size, more modifiable, or more easily maintained
	- Ensure there are no side conversations, distractions, and do not waste time
	- Document a summary of all findings and recommendations and obtain all participants' signatures
	- The lead programmer may prepare a Memo for Record for the ADS manager, if deemed necessary

	Coordinate Tasks with Appropriate Working Group(s)
	Determine if any external working groups are working any issues that could impact the design
	Inform the working group(s) that you have completed the ***software*** design
	Arrange a briefing to the group(s)

	Requirements Traceability Matrix
	Review the requirements traceability matrix created in the System Requirements Phase and make the updates identified in the Software Design Document

	Update draft(s) of all Test Documentation
	Review the Software Test Document(s) and make appropriate updates to ensure consistency with the Software Design Document

Ref(s): Software Test Plan (STP)/Software Test Descriptions(STD), Data Item Descriptions (DID).

	Define / Document Integration Test Criteria and Strategy
	CRITERIA; identify the following:
	Accuracy requirements for test results
	Allowable upper and lower bounds of test results
	Maximum and minimum duration of tests, in terms of time and number of events, to obtain the results
	Conditions under which the test results are inconclusive and re-testing is to be performed
	Severity of processing errors associated with the test result
	Additional criteria that may be unique to this design
	STRATEGY; provide the following:
	Operator actions and equipment operations required for each step
	Expected results for each step
	Evaluation criteria for each step, as applicable
	Actions to follow in the event of a program stop or indicated error
	Procedures to be used to reduce and analyze test results

	Contact Appropriate Working Group(s)
	Determine if any working groups are working any issues impacting the design
	Inform the working group(s) that you have completed the ***software*** design and all documentation
	Arrange a briefing for the group(s)

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Atch 5.4.1-1
Code and Test Procedures

Ref(s): Software Development Plan; Software Design Document; Software Test Plan

	Obtain training in Code and Testing Methodology
	Ensure the coding team is proficient in the prescribed development language(s).
	Ensure the coding/testing team is familiar with the accepted testing methodology.
	If the personnel are lacking in either area, arrange to provide proper training to those who need it by contacting the Directorate of Professional Development.

	Prepare Publication Announcement
	Prepare and submit to SSC/SSQ a brief synopsis of publications to be published at least 120 days prior to the anticipated publication date. The narrative description is used to solicit requirements, by publishing it in the weekly Air Force Publication Bulletin, so the Publication Distribution Offices can collect distribution requirements from all activities they service. The letter will include the following: (1) Publication number, volume number, and title; (2) A brief synopsis of the publication; (3) A statement of who should order or should use the publication; (4) The distribution symbol; (5) The OPR office symbol; and (6) The preparing agency office symbol, if different from the OPR.

FIGURE 5.4.1-1

Sample announcement of documentation for publication:

FROM: SSC/SMX (Mr Doe/4200)

SUBJECT: Request for Announcement of AFM XX-XXX, Volume XX in Publishing Bulletin

TO: SSC/SSQ

1. Request the following publication be announced in the Air Force Publishing Bulletin. AFM X-XXX, Volume XX, Z-100, Contingency Operation/Mobility Planning and Execution System (COMPES) Combat Logistics System (CLS) Computer Aided Load Manifesting (CALM): A200B/AU, Users Manual/Operations Manual.

2. This manual provides user information pertaining to the inputs required, operating procedures, and outputs produced by the system. This manual will be required for load planners in all units with mobility requirements. Distribution will be "L." OPR: HQ MAC/DOCSA. This manual is scheduled for release on 1 Apr 1998.

ERNEST M. RIPLEY, GM-13
Chief, Base Logistics Mobility Branch
Directorate of Operations and Mobility Systems

Atch 5.4.1-1 Continued
Code and Test Procedures

Ref(s): Software Design Document (SDD)

	Identify and Evaluate Reusable Code Assets
	Identify the CSUs to be implemented by existing reusable software.
	Identify the CSUs which will become reusable software when implemented.
	Evaluate the reusable code assets to ensure the specified requirements will be satisfied by the proposed reusable code.

Ref(s): Design Documents

	Review Design and Requirements Documents
	Ensure Design and Requirements Documents to be reviewed include: SDD, IDD, SSDD, and DBDD.
	Ensure Design and Requirements Documents reflect any recent changes including outstanding action items from previous reviews.
	Ensure any changes to the Design and Requirements Documents are complete, consistent, unambiguous, feasible, codeable, testable, and traceable to the requirements.
	Update planning document(s), if needed.

	Develop Source Code
	Place source code under configuration management as specified by the Software Configuration Management paragraph of the SDP.
	Ensure effective programming methods are used to code the software (e.g. structured programming, code reuse, etc.)
	Ensure the sequence of code development considers factors such as criticality, difficulty, integration and test issues, and needs of the customer and end users, as appropriate.
	Ensure the requirements satisfied by the developed source code are traceable to the requirements matrix.
	Ensure source code is developed IAW with the Design Document(s) and the applicable references:
	Ada Programming Language (MIL-STD-1815A)
	DISA Technical Reference Model
	DISA, CIM Human Computer Interface Style Guide
	SSCR 700-10, Vol. I (Graphical User Interface Standards)
	AFM 171-100, Vol. I (Machine Independent ADS Standards)
	AFM 171-100, Vol. II (ADS Standards for H6000 Series ADS)
	AFM 171-100, Vol. V (ADS Standards for Systems on UNISYS ADP Hardware)
	AFM 171-100, Vol. VI (ADS Standards for Small Computers)
	AFM 171-100, Vol. VIII (ADS Standards for SMSCRC Systems)
	Accomplish Code and Test Work Reviews in form of structured walk-through(s) at intervals specified by the SDP.

Atch 5.4.1-1, Continued
Code and Test Procedures

	Generate Executables
	Place each executable under configuration management as specified in the Software Configuration Management paragraph of the SDP.

	Perform Testing in IAW Software Test Plans
	Review Software Test Plans, and perform Testing, Integrated Testing, and System Testing IAW the Software Test Plans.
	Insure the requirements and systemity specified by the design documents are satisfied.
	Update Software Test Plan and Software Test Descriptions as required.
	Compare any actual values to designed values for resources such as memory, processing time, communications, storage considerations, and other specified design parameters.

	Test Readiness Review (TRR) Question Set
	The questions below are an example of the questions that may be asked during a TRR: 1. What are the changes to the SW Requirements Specification (SRS) that have been approved and made since the SDR which impact CSCI testing?
	2. Were there any changes to the System/Segment Design Document (SSDD) or Database Design Document (SDD), since PDR and CDR which impact CSCI testing?
	3. What approved changes were made to the Software Test Plan (STP) and Software Test Description (STD), and how do they impact CSCI testing?
	4. What test procedures are to be used in conducting CSCI testing?
	5. What retest procedures are to be used for test anomalies and corrections?
	6. What CSC integration test cases, procedures, and results were used in conducting informal integration tests?
	7. What is the status of software test resources, i.e., test personnel, facility hardware, software, and materials?
	8. What are the limitations of all software tests?
	9. Have all software problems including all known discrepancies of the CSCI and test support software been identified and status provided?
	10. What are the remaining milestones schedules?
	11. Were all updates to the evolving documents; i.e., the Computer System Operator Manual (CSOM), Software User Manual (SUM), and Firmware Support Manual (FSM) accomplished?

Atch 5.4.2-1
Requirements Traceability Cross Reference Matrix

REQUIREMENTS TRACEABILITY CROSS REFERENCE MATRIX												
OCD Para	SSS Para	IRS Para	SSDD Para	SDD Para	IDD Para	CSCI XREF	SUBSYS SPEC PARA	PGM NAME	USER MANUAL REF	TEST ID NUMBER	TEST STEP	COMMENTS

Atch 5.4.2-2
Rapid Prototyping/Simulation

Overview

Prototyping is encouraged when requirements are uncertain. Prototyping is the best way to gain user buy-in and validate requirements. Use prototyping to produce a quick working model of a proposed system, when appropriate, using customer and analyst insight and interaction, experimentation, and demonstration. A basic system model can be built from initial customer specifications. The customer then responds to the demonstrated prototyped system. The prototyped system is modified accordingly and the customer again reviews for further refinement. This sequence is repeated until a satisfactory model is achieved. If the final prototyped version is functionally accurate and the software is constructed properly, it may be used as the production system. Remember that all artifacts called for in the entire software engineering process must be accomplished **(*See Figure 5.4.2-2*)**.

Procedures

The following table outlines the procedures for prototyping.

Procedures
a. During the Software Engineering Process Pre-Development Phase, all requirements should have already been analyzed. The following tasks should have been accomplished: (1) Determined that the project is feasible and should be attempted. A cost/benefit assessment is normally required to justify expenditure of resources on the project. (2) Examined alternatives and designed a practical approach for a solution. Developed a comprehensive problem and scope statement that established project boundaries, and coordinated with all customers. (3) Developed a plan for the project's growth. b. The Prototype process starts in the Software Engineering Process Development Phase. (System Requirements/Design; Software Requirements/Design) The objective of this phase is to perform a system requirements analysis and design the system and software. (1) The software analyst determines general system and software requirements and proposes a system design. The analyst also determines software requirements and proposes a software design, all based on preliminary fact-findings and experience. This phase describes an expanded list of functions, transactions, data elements, and customer procedural responsibilities. The objective is to get the model completed as soon as possible without the formalities of detailed format descriptions. (2) The customer's concurrence with the system proposal need only be a general agreement with the proposed procedural flow and that the system will most likely meet mission needs.

continued on next page...

Procedures, Cont'd

Procedures

(3) At this point, technical issues should be addressed. Consult with those who will code and maintain the production version of the system. Consider the programming language, file structures, protocols, and hardware assignments that will be required in the final production system. Surface and resolve possible problem areas that may occur during system construction.

(4) Build Prototype. Develop and test a baseline prototype model.

(5) Simulate the Prototype.

(a) Create a system environment to simulate the prototype. Use the simulation to ensure the prototype is comprehensive, accurate enough to be relied on, and functional enough to be useful. The simulation will allow you to analyze the system's performance and gain an understanding of the system's behavior. Timing and sizing issues must be resolved before the prototype is fielded. Specifically, the following dynamic attributes must be verified:

1. Interrupt handling and context switching,
2. Response times,
3. Data transfer rate and throughput,
4. Resource allocation and priority handling, and
5. Task synchronization and intertask communication.

(b) The simulation environment must be as close as possible to the target operational environment. Numerous tools (CASE, Simulation Control Language (SCL), mathematical models, etc.) are available to assist with the simulation process.

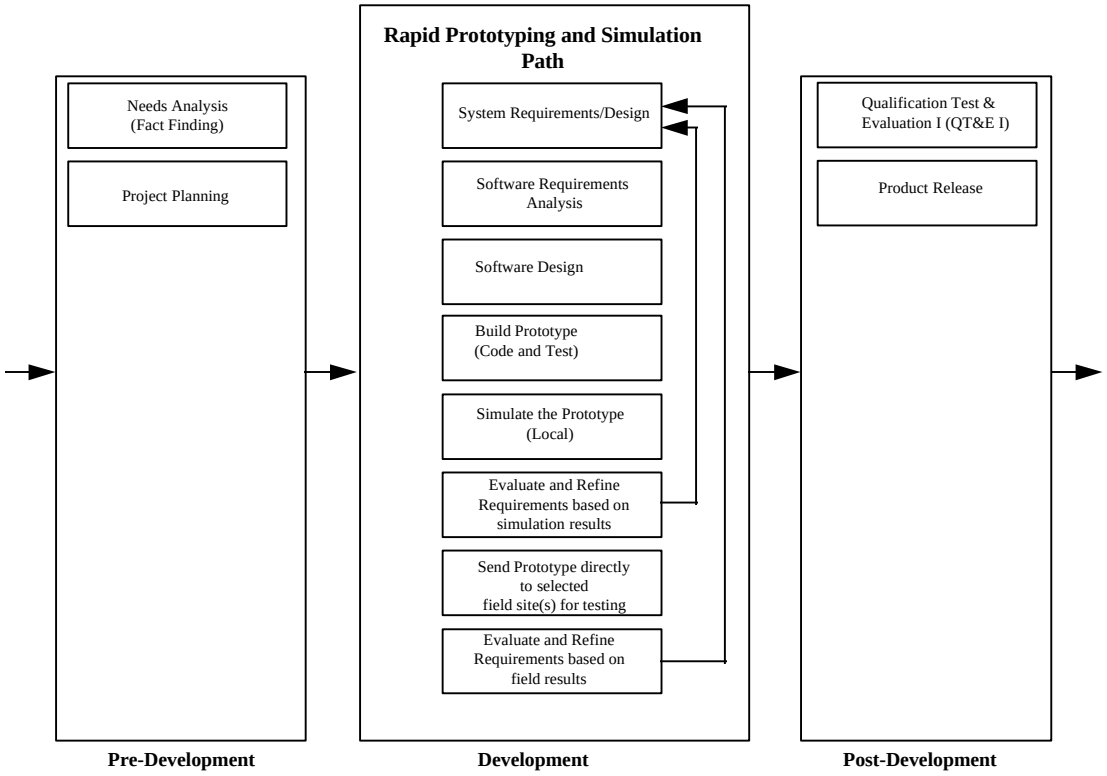
(6) Evaluate and refine requirements based on simulation results. The results of the simulation is reviewed and discussed with the customer. The customer will either refine, expand, or accept the results based on the requirements. Record all results and related changes to the functional scope of the prototype. Update all written descriptions of the prototype as applicable.

c. Send prototype system to selected field sites(s) for testing.

d. Evaluate and refine requirements based on field results. The results of field testing is reviewed and discussed with the customer. The customer will either refine, expand, or accept the prototype as meeting stated requirements. Record all results and related changes to the functional scope of the prototype. Update all written descriptions of the prototype as applicable. ***Once field testing of the prototype is satisfactory, a final package should be delivered to SSQ for formal test and release.***

Figure 5.4.2-2

Outline The following diagram illustrates the Rapid Prototyping and Simulation path for the SEP.



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Atch 5.4.2-3
Security Documents

(Documents are being developed by security at time of this printing.
Contact Security office SSC/RMMS/6-4114.)

Post-Development

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6.0

The Post-Development Phase

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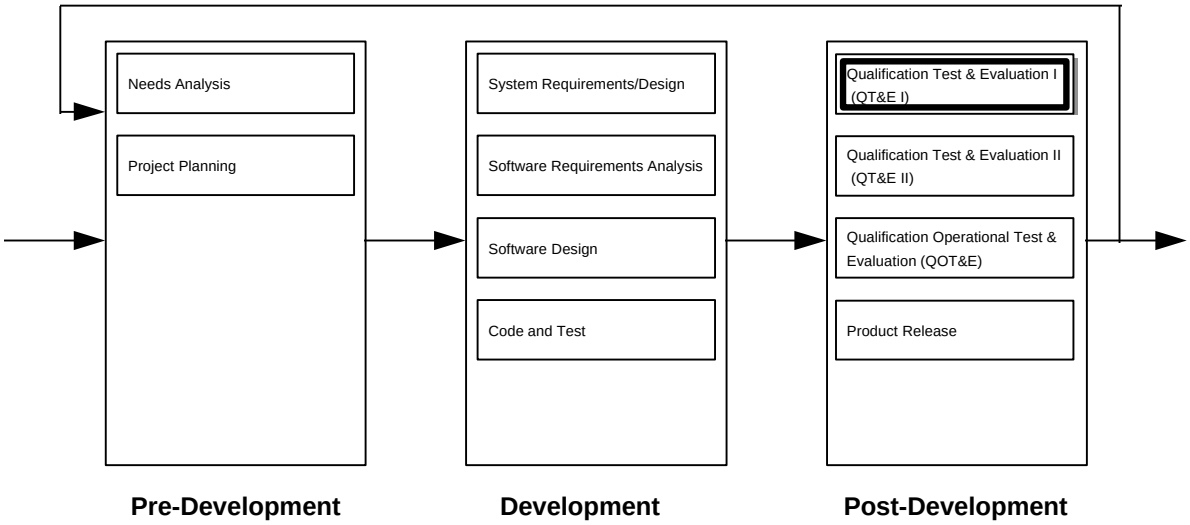
6.1 Qualification Test & Evaluation I: Overview

Purpose

To test computer software and review documentation by an independent test group before operational release. Testing includes the interaction of multiple software systems residing on a single or multiple hardware platform(s).

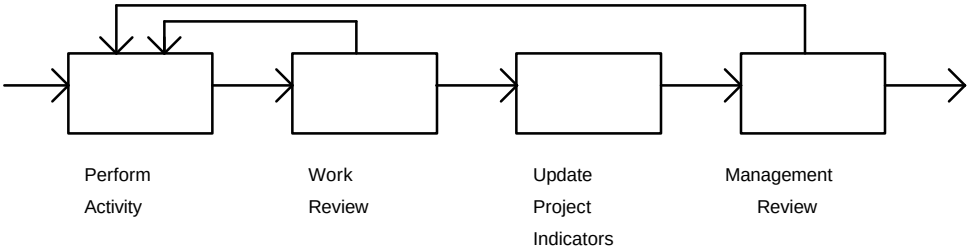
Where We Are

This diagram illustrates where the Qualification Test & Evaluation I process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete the Qualification Test & Evaluation I process.



In This Section The specific Qualification Test & Evaluation I stages will be covered in the following sections.

QT & E I Stages	Section
Perform Activity	6.1.1
Work Review	6.1.2
Update Project Indicators	6.1.3
Management Review	6.1.4

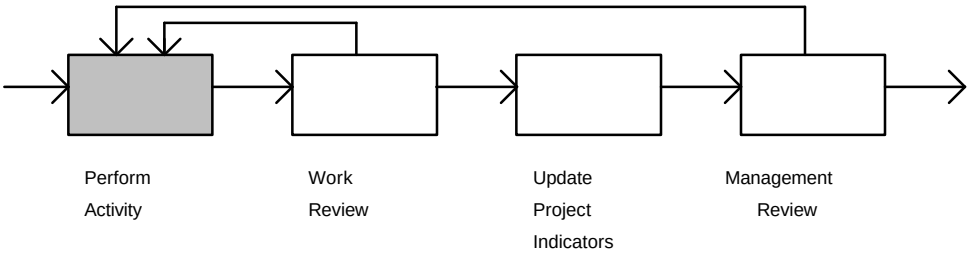
6.1.1 Qualification Test & Evaluation I: Perform Activity

Purpose

To independently verify the software function, performance and reliability requirements and the adequacy of the documentation.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	All of the Turn-In activity requirements have been accomplished.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Software Development Plan	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.
Computer Center Software Operator Manual	Tells computer center personnel how to operate software that will run in that environment
Software Installation Plan	Describes plans for installing software at user sites, training users, and converting from old systems.
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Security Certification Letter	An endorsed letter certifying the integrity of the software.
Software	Software program(s) to be tested
Software Test Description	Provides test cases/procedures for testing
Software User Manual	Tells a hands-on user how to operate the software
Software Test Plan	Provides high-level planning for testing
Test Data	Input data, databases, etc., to be used for verification testing.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Test Preparation	Ensure all necessary software/documentation is available for the test.	Atch 6.1.1-2 (Page 6-347)
Test the Software	Follow software test plan	Atch 6.1.1-2
Evaluate Documentation	Evaluate the software and support documentation.	Atch 6.1.1-2
Software Test Report	Complete software test report	Atch 6.1.1-2

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Support Offices	Ensure schedule feasibility considering the availability of skills, tools, and hardware.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).
System Coordinator	Project Office individual who will be available during the testing cycle to respond to test results.

Product Summary

The following products are produced in this stage.

Product	Description
Security Certification Letter	An endorsed letter certifying the integrity of the software.
Software Test Report	Describes the results of integration, software system, or other system testing

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Errors Detected	Number of Errors and Recycles
Hours Expended	Track number of hours in testing
Resources	Track amount of resources spent in testing

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	The testing and Software Test Report have been successfully completed.

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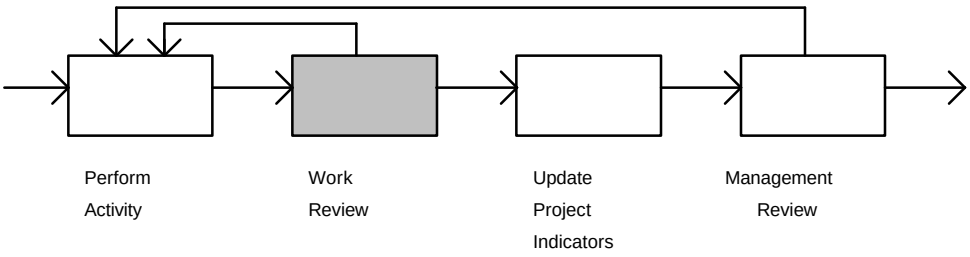
6.1.2 Qualification Test & Evaluation I Work Review

Purpose

To ensure test and evaluation was conducted in accordance with the software test plan and to assess the results.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Software Installation Plan	Describes plans for installing software at user sites, training users, and converting from old systems.
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Security Certification Letter	An endorsed letter certifying the integrity of the software.
Software Test Description	Provides test cases/procedures for testing
Software Test Plan	Provides high-level planning for testing
Software Test Report	Describes the results of integration, software system, or other system testing
Computer Center Operator Manual	Tells computer center personnel how to operate software that will run in that environment
Software User Manual	Tells a hands-on user how to operate the software

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Present material for review
Functional OPR	Represents functional viewpoint
Review Panel	Reviews material
Support OCRs	Support review panel, as needed, on specific items
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Technical Risks	Risks identified during the review.
Review Defect Report	Defects identified during the review.
Review Action Items	Action items taken during the review.
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).
Review Recommendation	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Track number of hours in the Work Review.

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Review Panel...	THEN...
Approves Technical Content	Project proceeds to the Qualification Test & Evaluation I Update Management Indicators stage.
Disapproves Technical Content	Project returns to the Qualification Test & Evaluation I Perform Activity stage.

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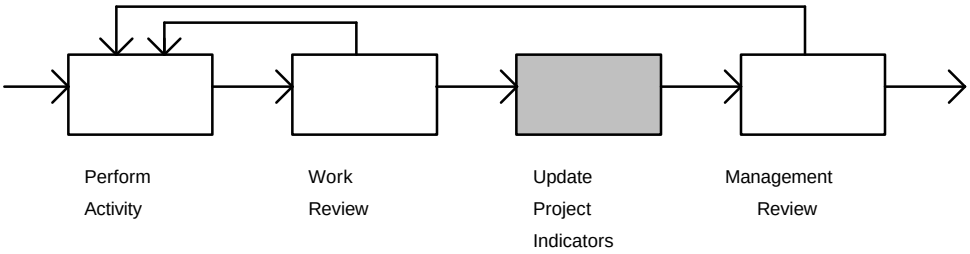
6.1.3 Qualification Test & Evaluation I: Update Project Indicators

Purpose

To update project indicators to show the impact of test results.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	All software testing has been technically reviewed and approved.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Software Test Plan	The plan for conducting the testing
Software Test Report	Describes the results of integration, software system, or other system testing

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-48)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Has responsibility and overall authority for the software/documentation.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).
Support Offices	Provide support as requested by (Project Officer) or Program Manager.

Product Summary

The following products are produced in this stage.

Product	Description
Cost Estimate	Revised cost estimate
Schedule Estimate	Revised schedule estimate

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	The actual number of hours spent on QT&E I.
Resources	The actual resources consumed in this testing.

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.

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6.1.4 Qualification Test & Evaluation I: Management Review

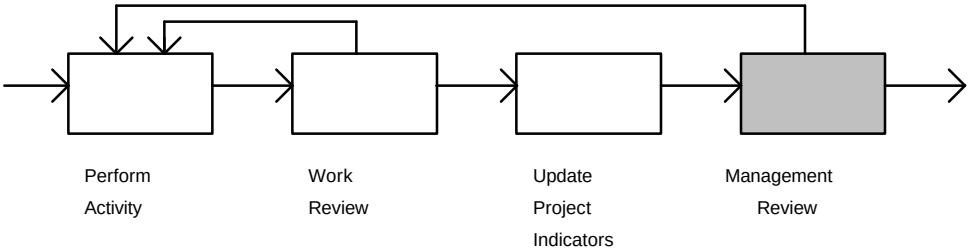
Purpose

The purpose of this review is to:

1. Provide management visibility.
2. Assess the impact of test and evaluation.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	The software testing has been conducted, technically reviewed, and project indicators updated.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Cost Estimate	Revised cost estimate
Schedule Estimate	Revised schedule estimate
Software Test Report	Describes the results of integration, software system, or other system testing
Review Recommendation	Review panel's recommendation to Approval Authority
Work Review Action Items	Deficiencies/corrective actions and other action items resulting from the Work Review
Work Review Minutes	Minutes describe the technical issues raised during the review

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Any changes that need to be made to the baseline must be identified, evaluated, assessed for risk, documented, planned, communicated to the affected groups or individuals and tracked to completion. The changes must be reprocessed through the Needs Analysis phase. - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove.
Project Office	Present review material to management.
Review Panel	Assist Management in the decision process.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Review Action Items	Action Items taken during the review.	F
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).	F
Approval Authority's Continuation Decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	F

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Hours expended in conducting the review
Action Items	Number of action items assigned by the Approval Authority

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Approval Authority ...	THEN ...
Approves Continuation	The software/documentation package is tested and prepared for subsequent release.
Disapproves Continuation	The software/documentation package is recycled to bring it up to minimum standards.
Cancels Project	Refer to Cancellation process (see Appendix H).

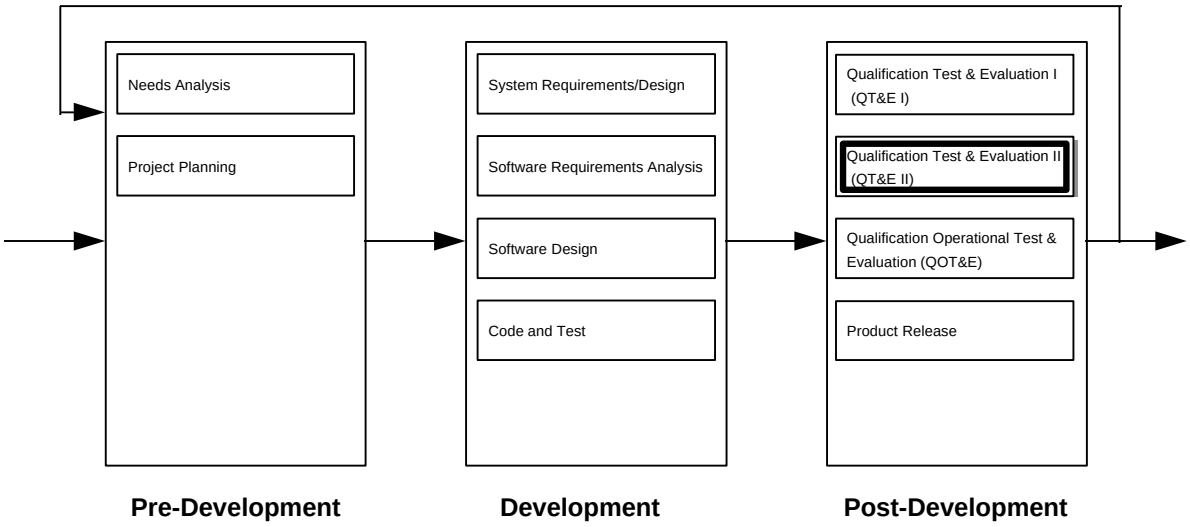
6.2 Qualification Test & Evaluation II: Overview

Purpose

To conduct formal testing in a "live" environment at one or more selected Air Force operational sites before release for operational use.

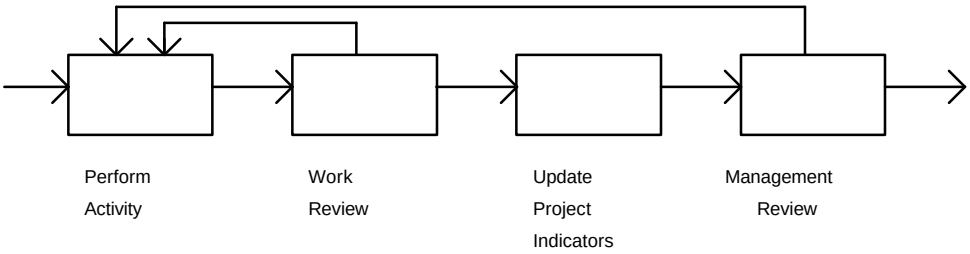
Where We Are

This diagram illustrates where the Qualification Test & Evaluation II process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete the Qualification Test & Evaluation II process.



In This Section

The specific Qualification Test & Evaluation II stages will be covered in the following sections.

QT & E II Stages	Section
Perform Activity	6.2.1
Work Review	6.2.2
Update Project Indicators	6.2.3
Management Review	6.2.4

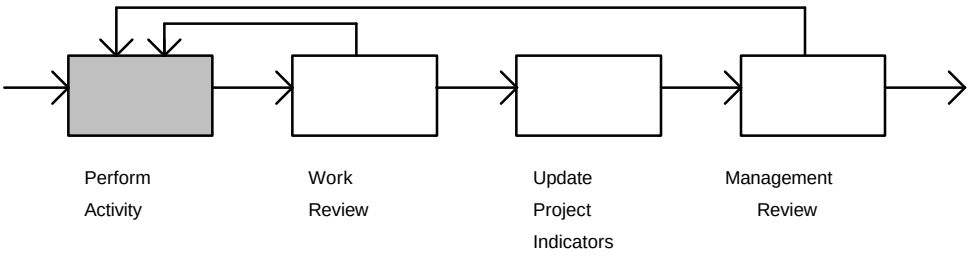
6.2.1 Qualification Test & Evaluation II: Perform Activity

Purpose

To conduct formal testing of computer software in a "live" environment at one or more selected sites before release for world-wide use.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	QT&E I has been accomplished.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Software Development Plan	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.
Authorization	Message coordinated among all affected agencies clearly authorizing the test and defining responsibilities and obligations.
Computer Center Software Operator Manual	Tells computer center personnel how to operate software that will run in that environment
Software Installation Plan	Describes plans for installing software at user sites, training users, and converting from old systems.
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Software	Software program(s) to be tested
Software Test Description	Provides test cases/procedures for testing
Software User Manual	Tells a hands-on user how to operate the software
Software Test Plan	Provides high-level planning for testing

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Test Preparation	Ensure all necessary software/ documentation is available for the test. Personnel are selected and responsibilities determined.	Atch 6.2.1-1 (Page 6-359)
Select AF Sites	Select a site or number of sites that best represent the field environment for which the requirements were written commensurate with all necessary coordination and qualifications.	Atch 6.2.1-1
Provide Sites Test Material	Test-sites are provided the software and/or documentation to be used. Inform the participants of what is expected of them, how they can receive assistance, and when reports are due.	Atch 6.2.1-1
Evaluate Documentation	Test sites evaluate the software and support documentation.	Atch 6.2.1-1
Software Test Report	Complete software test report as appropriate.	Atch 6.2.1-1

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Site Test Team	Team that will support the test site.
Project Office	Perform activities associated with this stage.
Support Offices	Provide support as requested by Project Officer.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Software Test Report	Describes the results of integration, software system, or other system testing

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Errors Detected	Number of Errors and Recycles
Hours Expended	Number of hours in testing
Resources	Track amount of resources spent in testing

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	Successfully completed the testing and Software Test Report

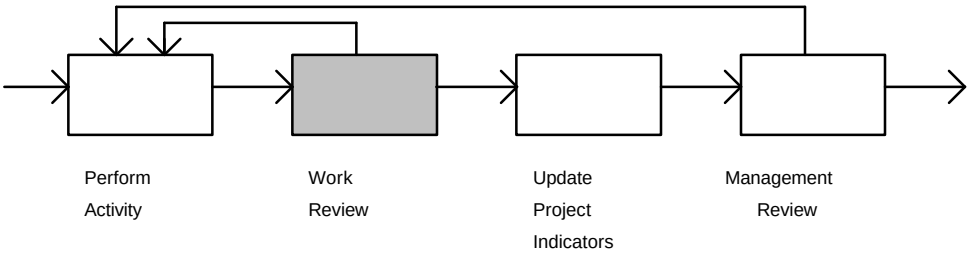
6.2.2 Qualification Test & Evaluation II Work Review

Purpose

To ensure test and evaluation was conducted in accordance with the software test plan and to assess the results.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Software Installation Plan	Describes plans for installing software at user sites, training users, and converting from old systems.
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Software Test Description	Provides test cases/procedures for testing
Software Test Plan	Provides high-level planning for testing
Software Test Report	Describes the results of integration, software system, or other system testing
Computer Center Operator Manual	Tells computer center personnel how to operate software that will run in that environment
Software User Manual	Tells a hands-on user how to operate the software

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Present material for review
Functional OPR	Represents functional viewpoint
Review Panel	Reviews material
Support OCRs	Support review panel, as needed, on specific items
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Technical Risks	Risks identified during the review.
Review Defect Report	Defects identified during the review.
Review Action Items	Action items taken during the review.
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).
Review Recommendation	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Track number of hours in the Work Review.

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Review Panel...	THEN...
Approves Technical Content	Project proceeds to the Qualification Test & Evaluation II Update Management Indicators stage.
Disapproves Technical Content	Project returns to the Qualification Test & Evaluation II Perform Activity stage.

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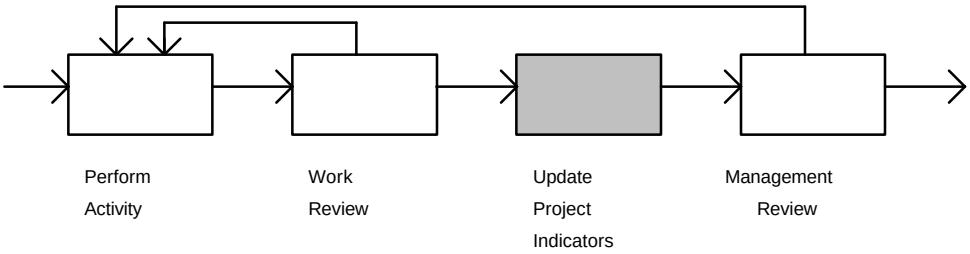
6.2.3 Qualification Test & Evaluation II: Update Project Indicators

Purpose

To update project indicators to show the impact of test and evaluation results.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	All software testing has been technically reviewed and approved.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Software Test Plan	The plan for conducting the testing
Software Test Report	Describes the results of integration, software system, or other system testing

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-48)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Has responsibility and overall authority for the software/documentation.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).
Support Offices	Provide support as requested by (Project Officer) or Program Manager.

Product Summary

The following products are produced in this stage.

Product	Description
Cost Estimate	Revised cost estimate
Schedule Estimate	Revised schedule estimate

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	The actual number of hours spent on QT&E II.
Resources	The actual resources consumed in this testing.

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.

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6.2.4 Qualification Test & Evaluation II: Management Review

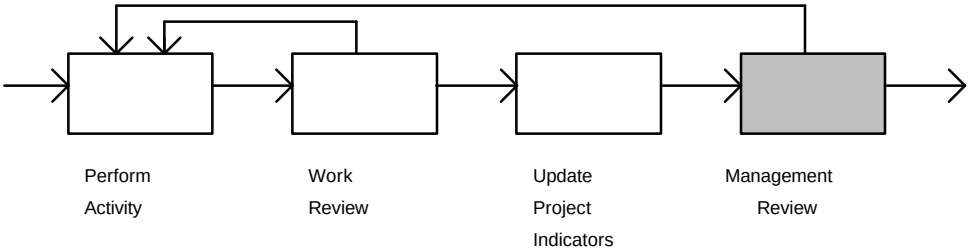
Purpose

The purpose of this review is to:

1. Provide management visibility.
2. Assess the impact of test and evaluation.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	The software design have been defined, analyzed, reviewed, and documented.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Cost Estimate	Revised cost estimate
Risk assessment	Identified risks and Program Manager's assessment/recommendation
Schedule Estimate	Revised schedule estimate
Software Test Report	Describes the results of integration, software system, or other system testing
Work Review Action Items	Describe the action items needed to be performed
Work Review Minutes	Minutes describe the technical issues raised during the review

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Any changes that need to be made to the baseline must be identified, evaluated, assessed for risk, documented, planned, communicated to the affected groups or individuals and tracked to completion. The changes must be reprocessed through the Needs Analysis phase. - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove.
Project Office	Present review material to management.
Review Panel	Assist Management in the decision process.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Review Action Items	Action Items taken during the review.	F
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).	F
Approval Authority's Continuation Decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	F

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Hours expended in conducting the review
Action Items	Number of action items assigned by the Approval Authority

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Approval Authority ...	THEN ...
Approves Continuation	The software/documentation package is tested and prepared for subsequent release.
Disapproves Continuation	The software/documentation package is recycled to bring it up to minimum standards.
Cancels Project	Refer to Cancellation process (see Appendix H).

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6.3 Qualification Operational Test & Evaluation: Overview

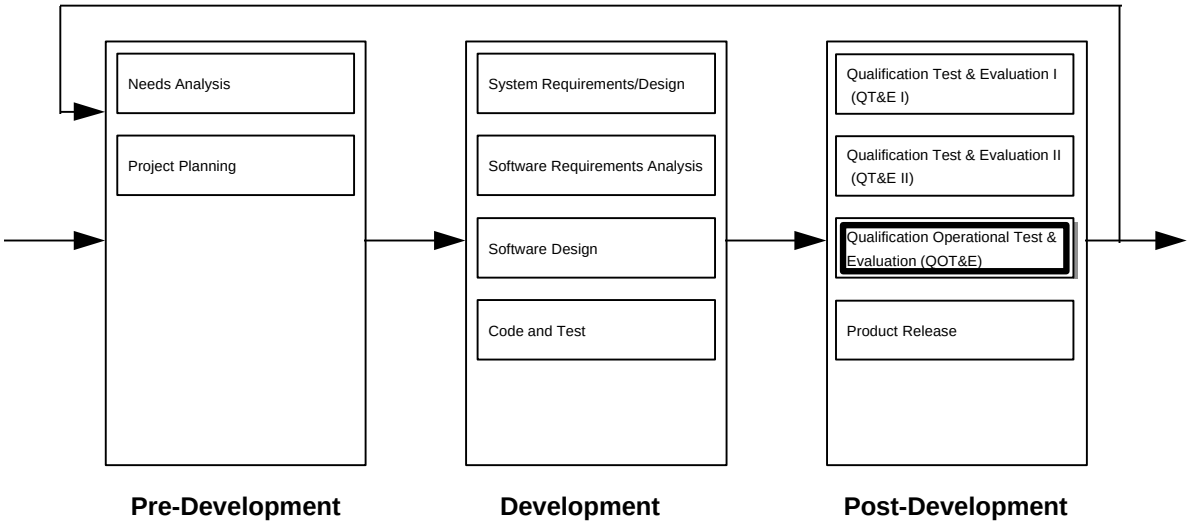
Purpose

To ensure that only operationally effective and suitable systems are delivered to the operating forces (AFR 80-14, para 14). To also ensure that new systems meet user requirements and operate within their planned operational and maintenance concepts (AFR 55-43, para 1-1). AFOTEC testing is normally done for new systems only.

NOTE: QOT&E is accomplished by the Air Force Operational Test and Evaluation Center (AFOTEC). Their procedures and practices are not governed by SSC. Organizations which are involved in QOT&E are supported by Quality Assurance (SSQ) much in the same way any other field site is supported except that releases made to these sites are usually handled as "emergency" releases to expedite support.

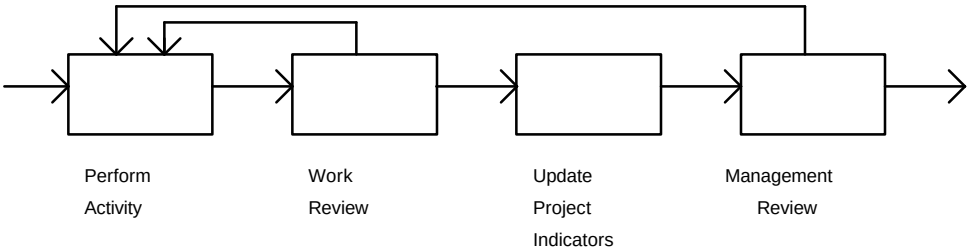
Where We Are

This diagram illustrates where the Qualification Operational Test & Evaluation process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete the Qualification Operational Test & Evaluation process.



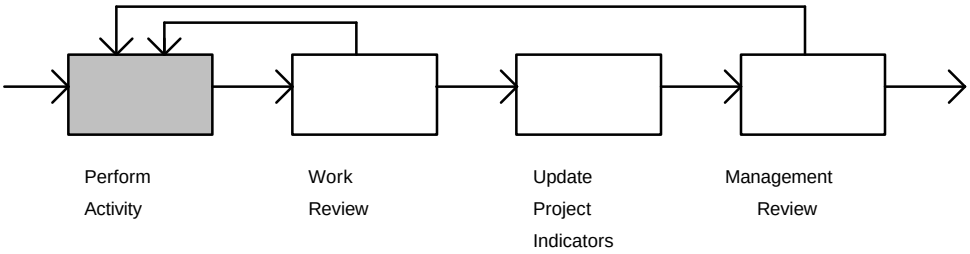
In This Section The specific Qualification Operational Test & Evaluation stages will be covered in the following sections.

QOT&E Stages	Section
Perform Activity	6.3.1
Work Review	6.3.2
Update Project Indicators	6.3.3
Management Review	6.3.4

6.3.1 Qualification Operational Test & Evaluation: Perform Activity

Purpose To Support Qualification Operational Test and Evaluation by AFOTEC

Diagram This diagram shows the context for this stage.



Entry Criteria Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	The Test and Evaluation Master Plan must be approved.
	The Qualification Operational Test & Evaluation Plan must be approved.
	The Test Resource Plan must be approved.
	Qualification Test and Evaluation (I and/or II) must be complete.
	Functional Qualification Review must be complete.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Software Development Plan	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.
Operational Requirements Document	A document prepared by the respective using command describing performance, operation, support, characteristics, and the requirements for a specific candidate system.
Test and Evaluation Master Plan	The TEMP integrates critical issues, test objectives, evaluation criteria, system characteristics, responsibilities, resources, and schedules for QOT&E.
Qualification Operational Test and Evaluation Plan	The document prepared by QOT&E agency (usually AFOTEC) that details the background, scope, and procedures for conducting the QOT&E.
Test Resource Plan	The basic resource management document used throughout the QOT&E planning process. Identifies resources required to support testing; is the basis for budget submissions, and manpower plans prepared by AFOTEC.
Test Limitations	Provided by the project office to describe unique situations and limitations relevant to this test.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Chair the Test Plan Working Group (TPWG)	Resolve test-related issues	Atch 6.3.1-1 (Page 6-cccLxv)
Chair the Joint Reliability and Maintainability Evaluation Team (JRMET)	• Hold JRMET meeting during the test to make sure the data being collected is correct • Resolve any test-related R&M issues during testing • Hold a JRMET meeting at the end of the test to review all PQDRs (held at the test site)	Atch 6.3.1-1
Chair the Material Improvement Project (MIP) Review Board (MRB)	• SPO assigns MIP number to valid PQDRs • Manages resolution of MIPs • Manages classification and resolution of PQDRs • Reviews prioritized PQDR list for agreement • Recommends closure of MIPs • Update and distribute MIP Status Report	Atch 6.3.1-1
Provide Membership on the Test Data Scoring Board	• Government-only held in conjunction with the JRMET • Compiles and scores R&M data after JRMET review	Atch 6.3.1-1

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Chair TPWG, JRMET, MRB, provide membership on TDSB Support AFOTEC during QOT&E
AFOTEC	Conduct QOT&E, chair TDSB, provide membership on TPWG, JRMET, and MRB
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).
Functional OPR	Support QOT&E test, possibly with test team members; Provide membership on TDSB, TPWG, JRMET, and MRB

Product Summary

The following products are produced in this stage.

Product	Description
Program Quality Discrepancy Reports (PQDR)	Provides information for both deficiencies and proposed enhancements on operational and logistics supportability of new systems or equipment during all phases of QOT&E (TO 00-35D-54).
Material Improvement Project (MIP)	A MIP is established when a deficiency or enhancement is determined to warrant further investigation and is used to monitor and control all actions related to it (TO 00-35D-54).
MIP Status Report	Tracks MIP/PQDR status. May be manual or automated (e.g. INFOCEN at WPAFB OH). It is updated at least monthly and send copies to the PQDR originator and other program participants.
QOT&E Report	The test team prepares the final QOT&E report to answer critical operational issues and present constraints and limitations, results, conclusions, and recommendations as an executive-level document to decision makers, planners, and operators.

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Track number of hours spent in QOT&E boards
Errors Detected	Number of PQDRs generated
Resources	Track amount of resources spent supporting QOT&E

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	The software and software test plans have been developed and documented.
	Project risks have been identified, documented, and their impact assessed.

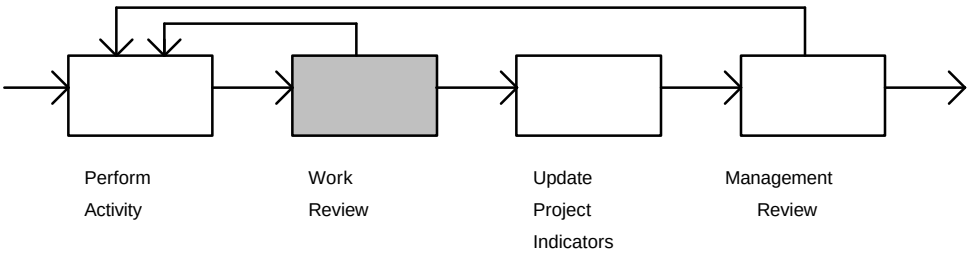
6.3.2 Qualification Operational Test & Evaluation Work Review

Purpose

To ensure test and evaluation was conducted in accordance with the software test plan and to assess the results.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	The program/project office has completed development of the source code.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Product Quality Discrepancy Reports (PQDR)	Provides information for both deficiencies and proposed enhancements on operational and logistics supportability of new systems or equipment during all phases of QOT&E (TO 00-35D-54).
Material Improvement Project (MIP)	A MIP is established when a deficiency or enhancement is determined to warrant further investigation and is used to monitor and control all actions related to it (TO 00-35D-54).
MIP Status Report	Tracks MIP/PQDR status. May be manual or automated (e.g. INFOCEN at WPAFB OH). It is updated at least monthly and send copies to the PQDR originator and other program participants.
QOT&E Report	The test team prepares the final QOT&E report to answer critical operational issues and present constraints and limitations, results, conclusions, and recommendations as an executive-level document to decision makers, planners, and operators.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Present material for review
Functional OPR	Represents functional viewpoint
Review Panel	Reviews material
Support OCRs	Support review panel, as needed, on specific items
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Technical Risks	Risks identified during the review.
Review Defect Report	Defects identified during the review.
Review Action Items	Action items taken during the review.
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).
Review Recommendation	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Track number of hours in the Work Review.

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Review Panel...	THEN...
Approves Technical Content	Project proceeds to the Qualification Operational Test & Evaluation Update Management Indicators stage.
Disapproves Technical Content	Project returns to the Qualification Operational Test & Evaluation Perform Activity stage.

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6.3.3 Qualification Operational Test & Evaluation: Update Project Indicators

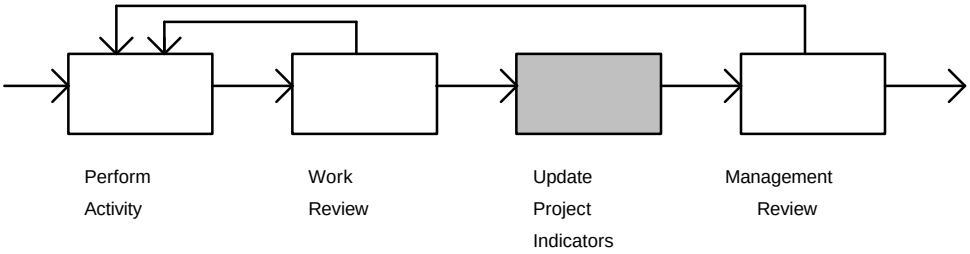
Purpose

The purpose of this process is to:

1. Update project management indicators - Cost and Schedule.
2. Evaluate project risk and assess impact.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	All software and software test plans have been developed and reviewed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Review Defect Report	Defects identified during the review.
Review Action Items	Action items taken during the review.
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).
Review Recommendation	Review panel recommendation on technical suitability of material presented.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-48)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Responsible for updating Project Indicator.
Support Offices	Provide support to the Project Office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Cost Estimate	Revised cost estimate
Schedule Estimate	Revised schedule estimate

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	The actual number of hours spent on QOT&E.
Resources	The actual resources consumed in this testing.

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.

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6.3.4 Qualification Operational Test & Evaluation: Management Review

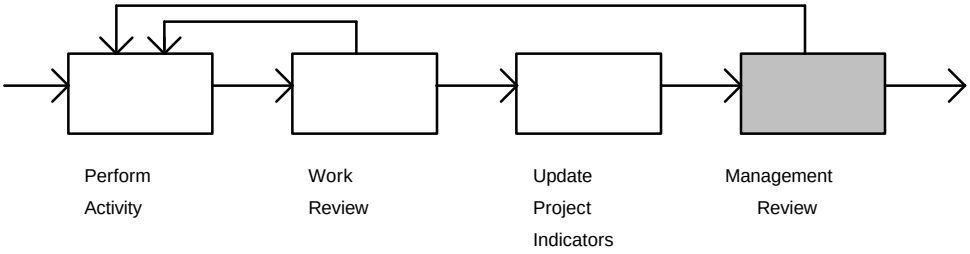
Purpose

The purpose of this review is to:

1. Provide management visibility.
2. Approve/disapprove the software.
3. Review revised project size, cost, and schedule estimate.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	Project cost and schedule estimates have been revised.
	Project risks have been analyzed and their impact assessed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Cost Estimate	Revised cost estimate
Review Recommendation	Review panel's recommendation to Approval Authority
Risk assessment	Identified risks and Program Manager's assessment/recommendation
Schedule Estimate	Revised schedule estimate
Security Certification Letter	An endorsed letter certifying the integrity of the software.
Software Test Report	Describes the results of integration, software system, or other system testing
Work Review Action Items	Deficiencies/corrective actions and other action items resulting from the Work Review
Work Review Minutes	Minutes describe the technical issues raised during the review

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove.
Project Office	Present review material to management.
Review Panel	Assist Management in the decision process.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Review Action Items	Action Items taken during the review.	F
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).	F
Approval Authority's Continuation Decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	F

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Categorized by: - Project Office Preparation - Reviewer Preparation - Conduct of the Review
Action Items	Number of action items assigned by the Approval Authority

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Approval Authority ...	THEN ...
Approves Continuation	The software/documentation package is prepared for subsequent release.
Disapproves Continuation	The software/documentation package is recycled to bring it up to minimum standards.
Cancels Project	Refer to Cancellation process (see Appendix H).

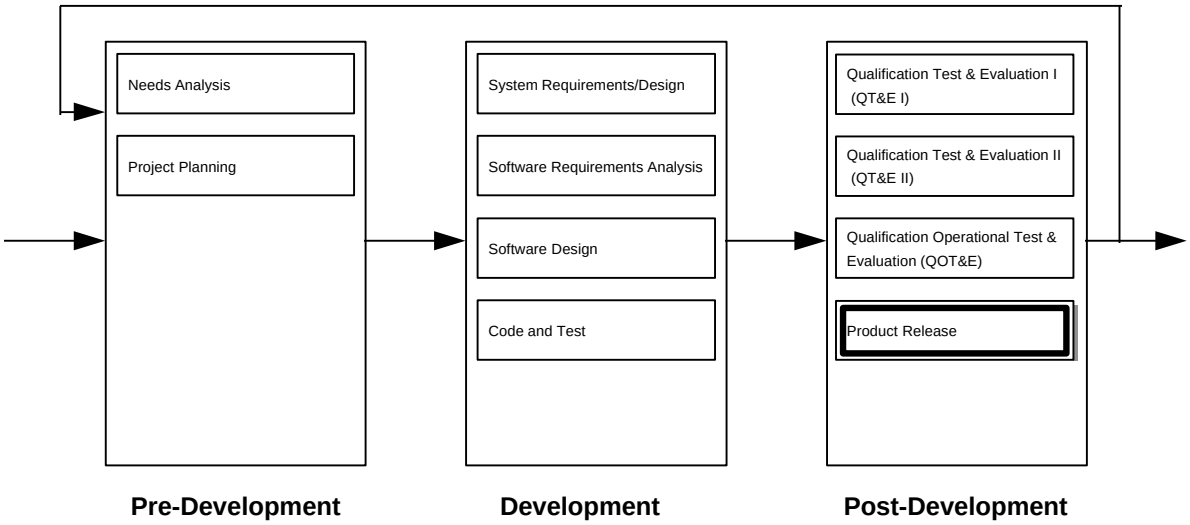
6.4 Product Release: Overview

Purpose

To release the software and/or documentation to all affected sites.

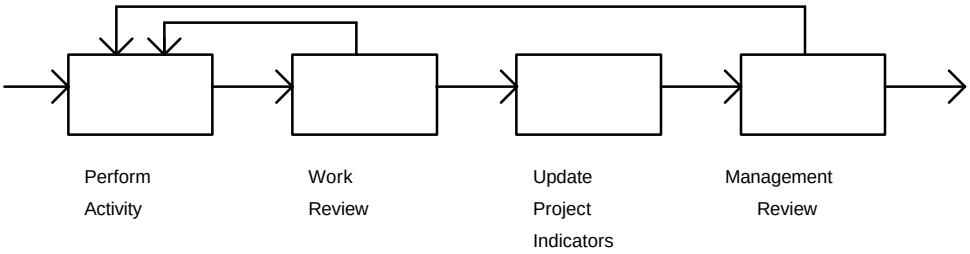
Where We Are

This diagram illustrates where the Product Release fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete the Product Release process.



In This Section

The specified Product Release stages will be covered in the following sections.

Release Stages	Sections
Perform Activity	6.4.1
Work Review	6.4.2
Update Indicators	6.4.3
Management Review	6.4.4

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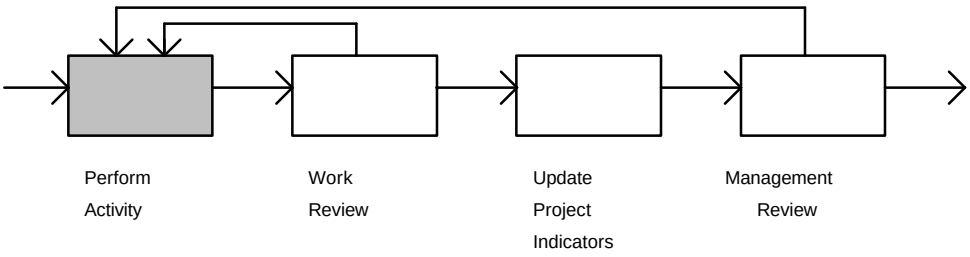
6.4.1 Product Release: Perform Activity

Purpose

The purpose of this stage is to provide to the user software/documentation that meets the requirement specifications and has passed all required testing.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	The release has been tested, prioritized, documented, and packaged.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Software Development Plan	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.
Software Test Report	Describes the results of integration, software system, or other system testing
Cover Letter	Draft letter describing rationale and authority for release.
Special Instructions	Instructions necessary to assist in loading the software but not appropriate for inclusion in the User's manual, Installation Procedures, or other standard documentation.
Distribution List	A list where the software will be sent.
Software and documentation	The application software and documentation to be released.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Merge software	Assemble all software elements and place on media appropriate for the system environment.	Atch 6.1.1-1 (Page 6-338)
Copy software	Make sufficient copies of media to support release requirement.	Atch 6.1.1-1
Print documentation	Print sufficient quantities of supporting documentation to support release requirement.	Atch 6.1.1-1
Prepare Cover Letter	Coordinate, sign, and print cover letter in sufficient quantities to support the release requirement.	Atch 6.1.1-1
Assemble components	Assemble the above components and inventory them to ensure the requirement can be met.	Atch 6.1.1-1

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
SSQ	Assemble all components for release, ensure everything is present and documented, and ship the release.
Support Offices	Provide all necessary components.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent. All appropriate documentation is attached.
Software Installation Plan	Describes plans for installing software at user sites, training users, and converting from old systems.
Software (Tapes, Diskettes, etc.)	Product Certification Baseline

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Track number of hours and resources expended in the preparation on the release. Hours should be tracked by a predefined category.
Resources & estimate shipping cost	Track amount of resources spent in the preparation of the release.
Number of software elements released	The number of applications and components software elements on the release
Number of pages of Documentation	The number of pages of documentation released by application and the total.

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	All software and supporting documentation is tested, as appropriate, assembled, packaged, labeled and ready for shipment.

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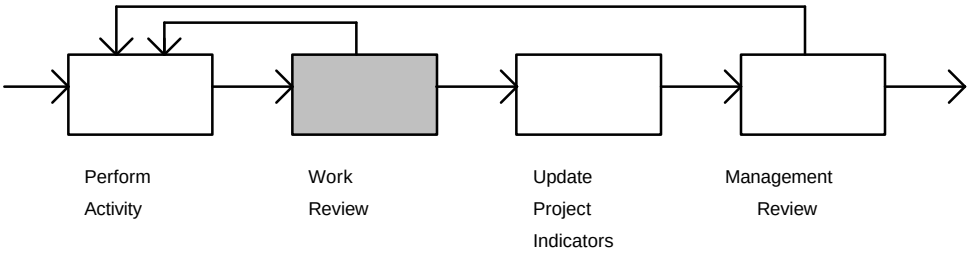
6.4.2 Product Release Work Review

Purpose

To ensure the project is technically ready to be released.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	A complete release package is assembled for shipment.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Security Certification Letter	An endorsed letter certifying the integrity of the software.
Software Test Report	Describes the results of integration, software system, or other system testing

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Present material for review
Functional OPR	Represents functional viewpoint
Review Panel	Reviews material
Support OCRs	Support review panel, as needed, on specific items
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Technical Risks	Risks identified during the review.
Review Defect Report	Defects identified during the review.
Review Action Items	Action items taken during the review.
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).
Review Recommendation	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Track number of hours in the Work Review.

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Review Panel...	THEN...
Approves Technical Content	Project proceeds to the Product Release Update Project Indicators stage.
Disapproves Technical Content	Project returns to Product Release Perform Activity stage.

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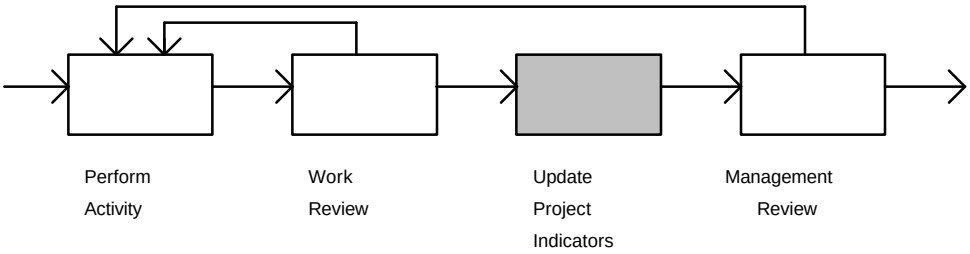
6.4.3 Product Release: Update Project Indicators

Purpose

To update project indicators reflecting the achievement of project release.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	Completion of Product Release Work Review.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Actual Cost	Record in the historical repository the final and actual project cost	Appendix B
Actual Schedule	Record in the historical repository the final and actual project schedule	Appendix B

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
SSQ	Update pertinent records to reflect actual status.
Support Offices	Provide information and materials to project office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Shipping Cost	Costs for shipping
Shipping Schedule	Planned verses actual
Cost and amount of materials used	Used to plan future shipment expenses and economic order quantity of materials used.
Hours Expended to pack and ship	Effectiveness of resource utilization.
DIREPS/SANs cleared	The number of Difficulty Reports and System Advisory Notices cleared by this release.
Number of elements, pages of documentation.	The number of programs and total pages of documentation contained in this release.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Estimate Schedule	Update schedule estimate
Estimate Cost	Update cost estimate

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.

6.4.4 Product Release: Management Review (Release Review)

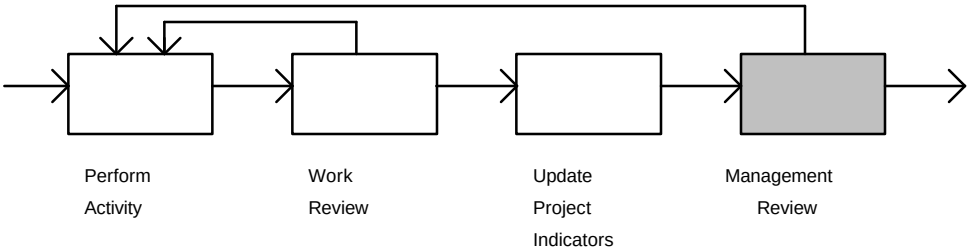
Purpose

The purpose of this review is to:

1. Provide management visibility.
2. Assess the readiness for release.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	Release cost and schedule estimates have been revised.
	Release risks have been analyzed and their impact assessed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Release Schedule	Steps and times necessary to complete release.
Review Recommendation	Review panel's recommendation to Approval Authority
Risk assessment	Identified risks and Program Manager's assessment/recommendation
Security Certification Letter	An endorsed letter certifying the integrity of the software.
Work Review Issues	Corrective actions taken to ensure quality release package.
Work Review Minutes	Documentation of actions taken to make release shipment.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Any changes that need to be made to the baseline must be identified, evaluated, assessed for risk, documented, planned, communicated to the affected groups or individuals and tracked to completion. The changes must be reprocessed through the Needs Analysis phase. - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove.
SSQ	Present review material to management.
Review Panel	Assist Management in the decision process.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Approval Authority's Continuation Decision.	Signed cover letter of Approval Authority's decision to approve/disapprove the release product.	F

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Hours expended in conducting the review
Action Items	Number of action items assigned by the Approval Authority

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Approval Authority ...	THEN ...
Approves Continuation	The release product proceeds to the operational sites for implementation. Enhancement requests and error reports from operational sites will proceed to the Needs Analysis Process in the Pre-Development Phase. For release to QOT&E, proceed to paragraph 6.3 (Page 6-299).
Disapproves Continuation	The product proceeds to the appropriate phase, process, and stage as directed by the approval authority.
Cancels Project	Refer to Cancellation process (see Appendix H).

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Attachments

Atch 6.1.1-1
Turn-In and Release Procedures

Purpose This attachment defines the procedures and process used to release automated data systems (ADS) software, documentation, and data.

Ref(s): Adapted from SSCR 700-4, Vol II para 3-14 & atch 10, 30 Oct 1987, change 1.

✓	Item
	1. **Purpose**. This chapter defines the procedures and process used to release automated data system (ADS) software, documentation, and data from the Standard Systems Center (SSC).
	2. **General**: Releases made from SSC in support of standard systems will be accomplished IAW the procedures contained herein. These procedures are based on the fact that the Director of Quality Assurance is the sole releasing authority, and most releases will be made by this activity. Releases from other agencies within SSC will not be made without the written approval of the Director of Quality Assurance (SSC/SSQ). Letters requesting such approval must describe the proposed release approach, specifically addressing how the essential functions of the standard release process will be accommodated (i.e., elements to be released and method(s), configuration management controls, description of changes, change projections, and release schedules). The goal in Quality Assurance is to be responsive, provide the best possible support to all developers, and meet the needs of the field with timely, top-quality software and documentation.
	a. **Release Types**.
	(1) **Block**. This type of release is scheduled. It is used to support the Standard Base Level Computer (SBLC), the Comptroller Office of the Future (COOF), and the MAJCOM data processing centers. A block consists of the software and documentation for all of the individual systems that are scheduled for a given release, and have successfully undergone required testing and evaluation. These systems combined make up the block which is released to applicable SBLC, COOF, and Honeywell (MAJCOM) data processing centers. A routine precedence is always assigned to a block release. Any release package that is normally part of a block release, but because of some unique requirement must be handled differently, must be justified as a special release.
	(2) **Special**. A special release is for software/documentation that is normally part of a block (i.e., applicable to the SBLC, COOF, or Honeywell), but for one reason or another must deviate from the established block schedule. It is also used to support/correct a unique situation/problem at specified sites. Normally the processing time for this type of release is 1 to 30 days from the date the software and/or documentation is turned in to the date of shipment, depending on the amount of testing and editorial support required. Use of this type of release requires special justification and is supported when justified. There are other types of special releases which are described below.

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✓	Item
	(a) **Minicomputer**. This type of release supports minicomputer systems i.e., System 11, Wang, Datapoint, 3B2, etc.). A release may consist of system and/or application software and documentation, depending on the release requirements. Processing time for a routine minicomputer release is 30 to 60 days from the date the software and/or documentation is turned in to the date of shipment, depending on the amount of testing required and editorial support. These releases should be scheduled when possible; however, out-of-cycle releases are supported when justified.
	(b) **Microcomputer**. This type of release supports microcomputer systems (i.e., Unisys PCs, Zenith, IBM, etc.). A release may consist of system and/or application software and documentation, depending on the release requirements. Processing time for a routine microcomputer release is 30 to 60 days from the date the software and/or documentation is turned in to the date of shipment, depending on the amount of testing required and editorial support. These releases should be scheduled when possible; however, out-of-cycle releases are supported when justified.
	(c) **Miscellaneous**. Logistics support only. This type of release is reserved for abnormal situations. (i.e., mail DIREPS to a contractor's facility, release source code, etc.). It is not for mailing equipment or correspondence. These items should be processed through the Transportation Management Office (TMO) or SSC/RM, as applicable. Depending on scope, the processing time for a miscellaneous release ranges from 1 to 30 days from the date the package is turned in to the date of shipment. Normally, these releases are turned in ready to ship; therefore, little delay is encountered with release processing.
	b. **Release Precedences**. Quality Assurance supervisors schedule work loads, direct testing, and process releases by taking into consideration the scope, complexity, resources, deadlines, and other parameters of the release. A priority scheme has been devised to provide a means to prioritize the work effort and is described below.
	(1) **ROUTINE**. This is the normal precedence given to any release. Any request that does not identify a precedence will be treated as a routine. Normally, Quality Assurance processes all routine requests on a first-in, first-out basis.
	(2) **PRIORITY**. This precedence is given to a release that does not necessarily require immediate attention but must be processed, shipped, and delivered earlier than would occur with a routine precedence. Use of this precedence, including the requirement of a specified ship date, must be justified.
	(3) **EMERGENCY**. This precedence is given to a release that must be processed and shipped as fast as possible to satisfy an emergency requirement. Some examples justifying an emergency release include a total computer system or automated data system failure resulting in the inability of one, multiple, or all bases to process payroll systems or launch aircraft; support software tests in the field when SSC individuals are on-site; and special projects directed by higher authority. All activities within the SSC must work together to ensure this type of critical requirement is satisfied immediately. If required, all routine and priority processing will cease until the emergency situation is resolved. An emergency precedence request must be thoroughly justified.

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✓	Item
	c. **Electronic Distribution of Software**. Release Control now has the capability to send software electronically which creates a release tape at the receiving site. Currently this process is reserved for emergency precedence special releases sent to SBLC sites. This process can accommodate selected sites or a worldwide release and is determined on a case-by-case basis. The determining factors are urgency of need, numbers of sites, and number of tape blocks.
	d. **Release Schedules**. Effective planning is essential for the production, maintenance, and support of "quality" automated data systems. The time required and complexities involved with coordinating system interface changes, test and evaluation, and production and distribution of documentation require substantial lead times. Release Control will prepare and distribute a release schedule for the SBLC, COOF, and Honeywell systems.
	e. **Release Projections**. To inform and support the end user, some visibility on forthcoming changes, release projections will be provided. As a minimum, the release projections for the next scheduled release will be provided with the release currently being processed (i.e., Dec 92 release would include projections for the Apr 93 release). If additional projections can be made with a reasonable degree of confidence, this would be even better. For users of the SBLC and COOF systems, BLISS provides this capability (reference AFM 171-530 Volume I/II). We encourage the development and use of this type of automated capability on other systems; however, in the meantime, a manually prepared projection document will be used. This document must be clearly identified as a release projection document, identify the ADS, title and system code (i.e., Core Automated Maintenance System (CAMS), System Code FS), identify the applicable time frame(s), and include a meaningful description of what's to come. This projection document is to be part of the turn-in package.
	3. **Block Release Procedures**.
	a. **SBLC Block Release Packages**. All ADS managers must prepare releases for the SBLC IAW AFM 171-530, Volume I/II, Base Level Integrated Support System (BLISS). Once an error-free capture has been obtained, provide Quality Assurance with the following:
	(1) Two copies of the signed and dated BLISS release list (AM3R7R), the release summary (AM3RLS), and the release tape index (AM3RLT). Please ensure the name assigned to the release is in the following format: release number - system code - cycle number (example: R920901-M3-1). For those ADSs that can not use BLISS, two signed and dated copies of AF Form 636, Systems Change Release Document, are required. See attachment 6.1.1-3 (page 6-351).
	(2) Software Test Plan and all supporting test materials.
	(3) Minutes from the Test Readiness Review (TRR).
	(4) Software Test Report.
	(5) For new, revised, or changed documentation, see paragraph 6, 7, or 8 as applicable.
	(6) Release Projection Document.
	(7) Security Certification Letter.
	b. **Honeywell Block Release Packages**. All ADS managers must prepare releases for the Honeywell systems as prescribed below.
	(1) Two signed and dated copies of AF Form 636, Systems Change Release Document.
	(2) Software Test Plan and all supporting test materials.
	(3) Minutes from the Test Readiness Review (TRR).

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✓	Item
	(4) Software Test Report.
	(5) User CAT/FILE strings with permissions for test JCL.
	(6) Tape number for:
	(a) Source Code.
	(b) Object software.
	(c) Any data files.
	(d) Test data.
	(7) For new, revised, or changed documentation, see paragraph 6, 7, or 8 as applicable.
	(8) Release Projection Document.
	(9) Security certification letter.
	c. **COOF Block Release Packages**. All ADS managers must prepare releases for the COOF IAW AFM 171-530, Volume I/II, Base Level Integrated Support System (BLISS). Once an error-free capture has been obtained, provide Quality Assurance with the following:
	(1) Two copies of the signed and dated BLISS release list (AM3R7R), the release summary (AM3RLS), and the release tape index (AM3RLT). Please ensure the name assigned to the release is in the following format: release number - system code - cycle number (example: C920901-TT-1). For those ADSs that can not use BLISS, two signed and dated copies of AF Form 636, Systems Change Release Document, are required.
	(2) Software Test Plan and all supporting test materials.
	(3) Minutes from the Test Readiness Review (TRR).
	(4) Software Test Report.
	(5) For new, revised, or changed documentation, see paragraph 6, 7, or 8 as applicable.
	(6) Release Projection Document.
	(7) Security certification letter.
	d. **Block Microcomputer Release Packages**. All ADS managers must prepare releases for microcomputer releases IAW AFM 171-530, Volume I/II, Base Level Integrated Support System (BLISS). Once an error-free capture has been obtained, provide Quality Assurance with the following:
	(1) Two copies of the signed and dated BLISS release list (AM3R7R), the release summary (AM3RLS), and the release tape index (AM3RLT). Please ensure the name assigned to the release is in the following format: release number - system code - cycle number (example: S920901-FS-1). For those ADSs that can not use BLISS, two signed and dated copies of AF Form 636, Systems Change Release Document, are required.
	(2) Software Test Plan and all supporting test materials.
	(3) Minutes from Test Readiness Review (TRR).
	(4) Software Test Report.
	(5) Release Projection Document.
	(6) For new, revised, or changed documentation, see paragraph 6, 7, or 8 as applicable.
	(7) Software to be released. This may consist of object code. When diskettes are involved, the procedures in paragraph 9 also apply.

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✓	Item
	(8) Special Distribution Requirements. ADSs having special distribution requirements (i.e., addressees other than the SBLCs), must provide Release Control with the required information to allow them to update their address data base. ADS managers may maintain an address data base of their own if so desired; however, the address data base maintained in Release Control will be the one used to ship releases. NOTE: Maximum use will be made of the site's local Customer Service Center (CSC), Small Computer Technical Center (SCTC), or equivalent, for reproduction and on-base distribution of diskettes and related documentation. Additional on-base addressees will not be accepted.
	(9) See paragraph 9 for additional requirements.
	(10) Security certification letter.
	e. **Block Minicomputer Release Package**. Turn-in requirements for these systems vary by system and will be defined at the time the release schedule for that system is established. As a minimum, the following will be required.
	(1) Two copies of the signed and dated BLISS release list (AM3R7R), the release summary (AM3RLS), and the release tape index (AM3RLT). Please ensure the name assigned to the release is in the following format: release number - system code - cycle number (example: S920901-FS-1). For those ADSs that can not use BLISS, two signed and dated copies of AF Form 636, Systems Change Release Document, are required.
	(2) Software Test Plan and all supporting test materials.
	(3) Minutes from Test Readiness Review (TRR).
	(4) Software Test Report.
	(5) Release Projection Document.
	(6) For new, revised, or changed documentation, see paragraph 6, 7, or 8 as applicable.
	(7) Software to be released. This may consist of object code. When diskettes are involved, the procedures in paragraph 9 also apply.
	(8) Special Distribution Requirements. ADSs having special distribution requirements (i.e., addressees other than the SBLCs), must provide Release Control with the required information to allow them to update their address data base. ADS managers may maintain an address data base of their own if so desired; however, the address data base maintained in Release Control will be the one used to ship releases. NOTE: Maximum use will be made of the site's local Customer Service Center (CSC), Small Computer Technical Center (SCTC), or equivalent, for reproduction and on-base distribution of diskettes and related documentation. Additional on-base addressees will not be accepted.
	(9) Security certification letter.
	4. **Special Release Procedures**.
	a. All special releases must be requested by letter. Processing time for a routine special release is 30 days from the date the package is turned in to the date of shipment, depending on the amount of testing and editorial support required. The following letter format applies to all special releases:
	(1) Address the letter from:
	(a) Routine/Priority: Your Division.
	(b) Emergency: Your Director.

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✓	Item
	(2) The subject of the letter will specify type of release, system title, and precedence of the release being requested (i.e., Special Release for the Core Automated Maintenance System (CAMS), Routine Precedence).
	(3) Address the letter to:
	(a) Routine/Priority: SSQ.
	(b) Emergency: SS.
	(4) System Code/DSD. (i.e., FS/G054)
	(5) Specific software (program names) to be released. NOTE: If an excessive amount of programs are being released, an attachment may be used.
	(6) Documentation (manual, volume, change number, title, number of pages) to be released. For documentation, see paragraph 6, 7, or 8.
	(7) Turn-in date. Provide the date the software is anticipated to be turned in to Release Control. NOTE: For each day the turn-in date is missed, the ship date must be adjusted accordingly.
	(8) Ship date. Provide the date the release is required to be shipped. Please ensure this date is consistent with the precedence being used.
	(9) Location. Provide name of base release is to be shipped to. Provide a distribution list if several sites are to receive this release. If addressee is not a normal distribution site, provide organization, office symbol, street address, base name, zip code, commercial telephone, as required by Release Control.
	(10) Justification. Explain the unique situation/problem the release will support or correct. NOTE: If this is a priority or emergency request, include in this paragraph the significant impact to the receiving site(s) if this release is not mailed by the shipped date requested. Please by specific.
	(11) POC and phone number.
	(12) Signature block.
	(a) Routine/priority: Your Division.
	(b) Emergency: Your Director.
	b. Responses to requests will be by indorsement.
	(1) For approved requests, initial notification will normally be provided by phone with formal response to follow with pertinent information applicable to the release. Upon notification of approval, turn-in package and release processing will begin.
	(2) For disapproved requests, initial notification will normally be accomplished by phone with formal response to follow with reason for disapproval.
	c. Datapoint and Wang Special Release Packages. Releases for these systems will be accomplished by submitting a request letter IAW the instructions in paragraph 4a above. Currently, these platforms are not tested by the Quality Assurance Directorate but provide editorial support and some logistic support. All paragraphs pertaining to documentation apply.
	d. All Other Release Packages (i.e., Unisys PCs, Zenith, 3B2, etc.). Releases for these systems will to be accomplished as a Special Release and all instructions in this paragraph apply. (As other platforms are introduced into the SSC environment, any special release procedures required for those platforms will be developed.)

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✓	Item
	5. **Miscellaneous Release Procedures**. Turn-in requests for miscellaneous releases will be accomplished as follows:
	a. Requests to mail magnetic media to support unique situations require the following:
	(1) Request letter signed by directorate.
	(2) AF Form 636, Systems Change Release Document, signed and dated.
	(3) A printout of the information contained on the tape(s).
	b. Release Control will complete an AFCC Form 2244, Magnetic Tape Release Form, and pickup the tape from Production Control. Release Control will also provide a transmittal letter to accompany the tape.
	c. For the release of source code, paragraph 1 also applies.
	d. If the release is being hand carried, Release Control will package the tape(s).
	e. If the release is to be mailed, ensure a complete address is provided on the request letter, including a commercial phone number.
	6. **New Documentation Requirements**. Documentation being released to organizations outside SSC will be processed by Quality Assurance. Exceptions are certain functional user manuals that have approval to use other methods. Quality Assurance processing includes editing and reproduction which normally requires approximately 120 days. ADS managers must take this time into consideration when planning releases that include hard copy documentation. All new documentation packages must consist of the following:
	a. Announcement letter (see atch 5.4.1-1 figure 5.4.1-1).
	b. One reproducible copy or mats for editing.
	c. One copy for testing.
	d. AF Form 673, Request to Issue Publication, original plus 5 copies.
	e. AU Form 311, Printing and Collating Dummy Master.
	7. **Revised/Changed Documentation Requirements**. Documentation being released to organizations outside SSC will be processed by Quality Assurance. Exceptions are certain functional user manuals that have approval to use other methods. Quality Assurance processing includes editing and reproduction which normally requires approximately 70 days. ADS managers must take this time into consideration when planning releases that include hard copy documentation. All documentation packages must consist of the following:
	a. One reproducible copy or mats for editing.
	b. One copy for testing.
	c. AF Form 673, Request to Issue Publication, original plus 5 copies.
	8. **Revised/Changed Documentation Requirements for QT&E-II**. Documentation being released to QT&E-II sites will be in draft. Exceptions are certain functional user manuals that have approval to use other methods. The OPR will provide enough copies to Release Control to satisfy the request.
	9. **Diskette Copying Procedures**. The capability now exists to have diskettes reproduced in volume. This service was obtained primarily to prepare diskette releases for the Standard Systems Center; however, it may also be used to satisfy other requirements. Each of these and a verification process are addressed separately below.

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✓	Item
	a. **Reproduction to Support Release Processing**. Requests for release will be prepared and processed IAW paragraph 4 above; however, when the release involves diskettes, the following additional information must be included as attachments to the request letter, or a part of the turn-in.
	(1) Authorization to Copy. The requester must ensure that all copyright laws have been adhered to and that the Government does in fact have authorization to copy the diskette(s). The requester must provide certification addressing the applicability of copyright laws or a copy of the agreement between the Government and vendor which allows reproduction of software.
	(2) Format of diskette to be reproduced.
	(a) "5.25" or "3.5".
	(b) Single or double sided.
	(c) Specify density (i.e., 360K, 720K, 1.4MB, etc.)
	(3) Type of computer used to create the diskette(s) (Datapoint, IBM, Unisys PC, Zenith, Wang, 3B2, etc.).
	(4) Two copies of each master diskette. If the number of files to be released will not fit in block 8 of AF Form 636, provide a directory listing of each diskette.
	(5) Diskette labels. Provide label information with release request. Release Control has the capability to print labels, via a laser printer, for 5.25 and 3.5 diskettes.
	b. **Reproduction to Support Local Requirements**. Due to the overhead associated with run set-up, it is not considered economical to reproduce quantities of less than 25 copies per original diskette. These should be copied on the source computer. When quantities justify use of this capability, submit letter of request, using format specified in paragraph 4. Further, the information defined in paragraph 5.9.a will be needed along with the number of copies required.
	c. **Verification**. Upon completion of our reproduction process, and prior to further processing, diskette verification will be required. The ADS manager/requester will be requested to select random diskettes from the copied diskettes for testing and evaluation prior to further processing or release of the copied diskettes.
	10. **Software/Documentation recycles**. A recycle is the returning of a package to the system manager after errors have been found, either by Quality Assurance or the developer, after the original turn-in. The following procedures must be followed for all recycled software or documentation.
	a. **Test and Evaluation** (Software/Documentation). The evaluator will notify the system manager that errors have been found and the package needs to be recycled. If possible, only those faulty portions will be returned, otherwise the entire package will be recycled. Once all errors are corrected, the package or portions must be turned in again using the original turn-in procedures.
	b. **OPR-Requested** (Software/Documentation). If the system manager discovers errors after a package is turned in, notify Release Control immediately. In this way, the evaluation can be delayed or suspended, thereby not wasting time testing faulty software. A recycle request letter, signed by the software system director, must be submitted to the Quality Assurance Directorate. Explain the problem and what must be done to correct it. Release Control will then return the entire package to the system manager. Once all errors are corrected, the package must be turned in again using the original turn-in procedures.

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✓	Item
	c. **Documentation** (Editorial). The editor will notify the system manager and schedule a debriefing. After the debrief, the system manager must correct the errors and then return the documentation to the editor. When error-free, SSC/SSQM will obtain volume printing to satisfy distribution requirements.
	11. **Release of Source Programs**.
	a. The release of source code programs is strictly controlled. All SSC personnel must exercise utmost care when proposing the release of SSC developed source code. Only authorized sites with a thoroughly justified need are given access to source code.
	b. When requesting release of source code, the software system manager will route the release through SSC/SSML for staffing and approval/disapproval. If approved, the documentation listed below must accompany the request for release.
	(1) Approval Document.
	(2) Copies of justification, correspondence, or documents received from the requesting agency.
	(3) A disclaimer letter (original plus 2 copies) must be included. As a minimum, a disclaimer letters must state the following:
	(a) This software/documentation must not be offered to any other activity without prior SSC approval.
	(b) SSC will not be responsible for maintenance, updating, or correction of errors in the software or documentation.
	(c) If the release tapes belong to SSC, a statement reflecting current policy on the return of tapes should be included (i.e., for a commercial firm/institution, they should be returned within 10 days; for a Government installation, their return is not necessary, etc.).
	12. **General**.
	a. SSC will provide selected common-use software and documentation to the Federal Software Exchange Commission (FSEC) IAW Federal Property Management Regulation 101-36.16 for subsequent sale to authorized organizations. The local administration of the FSEC includes the life cycle manager's periodic review of software system candidates for submission to the FSEC. The software system manager will refer requests for FSEC software from NON-DoD federal, state, or local government agencies, educational institutions, and government contractors to the FSEC for action.
	b. If approved by the FSEC, the software system manager will follow the release preparation instructions in paragraph 4. In addition, attach copies of any justification, correspondence, or documents that you received from the requesting agency.

Atch 6.1.1-2
Qualification Test and Evaluation I Procedures

Purpose This attachment provides example procedures for conducting Qualification Test and Evaluation I testing. Ref(s): Adapted from SSCR 700-4, Vol II para 3-16 30 Oct 1987, change 1.

✓	Tasks	OPR
	1. Test Preparation	
	a. Ensure all required materials for conducting the test are available from the ADS Manager (see as a minimum the list of inputs for the QT&E I Perform Stage)	SSQ
	b. Decide if changes to program or documentation will be accepted after QT&E-I has started. Do not accept changes which would have an adverse impact on QT&E-I.	SSQ
	c. Ensure any required participation by user activity has been arranged by the ADS Manager	SSQ
	d. Ensure any emergency requests have been coordinated and approved by SSC/SS.	SSQ
	2. Test the Software	
	a. Execute all programs to ensure compliance with USAF standards, successful operability in the operating environment, and proper interface with other ADSs.	SSQ
	b. Analyze test results and decide if the system is operational and the impact of any problems.	SSQ
	c. Serious problems should be brought to the immediate attention of the ADS manager while lesser problems may be included in the software test report and the debrief to the ADS manager.	SSQ
	d. Task the ADS manager to correct serious software production problems within the QT&E I test period.	SSQ
	3. Evaluate Documentation	
	a. Examine the information system documentation to ensure it complies with USAF standards and supports the execution of the software production effort	SSQ
	b. Examine functional documentation to ensure it is compatible with the information system documentation and satisfies USAF standards requirements.	SSQ
	c. Decide (within SSC/SS) proper corrective action for non-conformance with AFM 171-100 standards that do not impact the processing environment at the DPC (e.g., invalid file-ID, invalid output header line format, blank page in output, etc.). SSC/SSQ cannot grant temporary waivers to AFM 171-100 standards.	SSQ
	4. Software Test Report	

	a. Prepare the Software Test Report 1) Send the system coordinator a formal written report (AFCC Form 2234 and 2234A) for projects less than 10 man-years. 2) Prepare a Software Test Report (STR) for projects equal to or greater than 10 man-years.	SSQ
	b. Debrief the ADS manager on test findings.	SSQ

continued on next page ...

✓	Tasks	OPR
	c. Grant product certification on the final Software Test Report, after tests meet with SSC/SS approval.	SSQ
	d. Do not approve the system for operational use if serious software production problems are not corrected. SSC/SS will make this decision after consulting with the ADS manager.	SSQ
	e. Upon request, brief the SSC Executive Director, SSC Directors, unit(s), and interested ADS managers on the results of QT&E-I and the content of changes to be included during the block release period.	SSQ
	5. Special and Emergency Actions	
	a. Process emergency release requests. Handle any requirement that cannot be processed by the above procedures as an emergency release. SSC/SS will process emergency patches within one work day, and handle emergency tape releases as soon as possible.	SSQ
	b. Process special releases. Special releases may be submitted for release to satisfy one-time or unique requirements at selected locations at any time, but the software must be submitted at least 30 days before the desired release date, unless prior coordination has been made between the ADS manager and SSC/SS.	SSQ

Atch 6.1.1-3
Instructions For Preparing AFCC FORM 2212
Project Summary Sheet (PSS)

Purpose This attachment explains how to prepare AFCC Form 2212, Project Summary Sheet (PSS). Ref(s): Adapted from SSCR 700-4, Vol II atch 5, 30 Oct 1987, change 1.

BLOCK	DESCRIPTION
1. Project Title	Enter from the CSRD or AFCC Form 2185.
2. Control Number	Enter from the AFCC Form 2185.
3. Management Category	Check the appropriate block.
4. SCS	Enter the appropriate SCS number (10, 80, 59, 49, etc .).
5. DSD	Enter the assigned data system designator. As applicable.
6. System Code	Enter the assigned system code. As applicable.
7. Review/Action Accomplished	Circle the appropriate review(s) completed. If other actions were completed, circle OTHER.
8. Completion Date	Enter the date the review or other action was completed.
9. Typed or Printed Name, Grade, Title, Official Symbol or Author, Review/Approval Official	Self-explanatory.
10. Signature	The author signs if the PSS is used for information. The review official signs if the PSS serves as review minutes. The approval official signs if the PSS documents a change to an item previously approved, or provides additional project direction.
11. Narrative Summary	Check the appropriate box. If the first block is checked, enter no further information. If the last box is checked, enter a brief summary of the action, capturing main event(s) and their status(es). Continue on the back of the form if necessary.
Distribution	Panel members, participants, and SSC/HO

Atch 6.1.1-4
Instructions For Preparing System Release Form AF Form 636

Purpose This attachment explains how to prepare AF Forms 636 in accordance with AFM 171-110, Volume I, for S1100 releases. Refer to AFM 171-103, Management Support System (MSS), for instructions on how to generate an S1100 automated release document. A sample AF Form 636 is provided at Atch 6.1.1-5 (Page 355). Ref(s): Adapted from SSCR 700-4, Vol II atch 9, 30 Oct 1987, change 1.

BLOCK	DESCRIPTION
1	Identify the development agency: For example SSC/SSB
2	Enter the date the form was prepared.
3	Functional areas should leave this item blank. SSC/SSQM will complete this item at the time of release. For block releases, enter block release number (i.e., R930901, R931001, S930916, etc.).
4	Enter the system code under which the change is being released.
5	Enter the system title outlined for the system code in accordance with AFM 171-100, Vol II.
6	Enter the four-character system change number for this release The first two positions are the system code; the last two positions are consecutive numbers identifying the change number.
7	Enter the distribution list for the release. Enter "All SBLCs," "All H6000 commands," or the name of the base(s) when selective distribution (i.e., Hill AFB) is to be made.
8	Enter program/file IDs to be included on the release (UPDATE) tape. If more than nine programs/files are being released, list them on an attachment. For H6000: Include all programs/files on one tape and turn in a copy of the Object Library Utilization Report. (Do not list it as an attachment.)
9	Enter the version date(s) for the programs(s)/file(s) to be released in Gregorian (MMDDYY) format. If more than nine programs/files are being released, include their version dates on the same attachment as the program/file IDs.

10	Enter "OPR Coordination," "Upon Receipt," or the actual effective date depending on the following: a. Enter "OPR Coordination" if the SBLC system monitor must initiate some action before running the program or using the file at the DPC. This will include program change which result in: (1) A change in 'VALUE' statements. (2) The sequence of programs as automatically started by the system. (3) Changes in Product Control Number (PCN) and part paper/special forms requirements. b. If the program/file is effective upon receipt and does not require "OPR Coordination", enter "Upon Receipt." c. If the program/file is to become effective at some future date, enter the appropriate date, for example, 1 Jan 1988. For programs run annually or semi-annually, specify a future effective date when releasing new versions of programs and retain a backup version.

continued on next page ...

Atch 6.1.1-4, Continued
Instructions For Preparing System Release Form AF Form 636

BLOCK	DESCRIPTION
11	Enter the AFM 171 series manual number and date of each basic volume which currently supports the system. Complete this block even if no documentation is being released.
12	If applicable, enter the functional area manual number.
13	Enter the implementation/conversion documentation for the system.
14	State a meaningful reason for the change. If there is insufficient room, or if more than nine programs/files are being released, include them on an attachment.
15	Place the certification statement required (see SSCR 205-16) in this block. Enter any special instructions required by the base(s) or command(s) to implement this change. (Note: These may be listed as an attachment.) Programs/files being released for one-time conversion or update should state: "One-time conversion/update only. Do not add to Operational Master."
16	List all DIREPs, H6000 incident Reports, or PANs/SANs/TANs cleared or rescinded by this release. a. DIREP(s) or Incident Report(s). List DPC number, month received and sequential number (for example, 5410-10-341). b. PAN/SAN/TAN Numbers. List the PAN/SAN/TAN numbers assigned by the FAB. Include information on the release forms to clear "patches" transmitted during the previous release period.
17	List all programs (by version) which should be removed from the "Operational Master" tape. Do not remove programs being converted until the month following their conversion.
18	Identify all attachments to be distributed to addresses listed in Block 7. List continuation of blocks on the release form first; list manuals last. a. Continue Blocks 8,9, 10, 14, or 15 if needed. b. Include special instructions. c. AFM 171-XXX, Vol I, C1, 1 Jun 93. d. AFM 171-XXX, Vol II, C2, 1 Jun 93.
19	Enter the name, rank, office symbol, and telephone number of the System Coordinator for the release package.
20	Enter an "X" in the appropriate block.

continued on next page ...

Atch 6.1.1-4, Continued
Instructions For Preparing System Release Form AF Form 636

BLOCK	DESCRIPTION
21	Justify why an emergency release is required; specify clearly why the changes cannot be made on the next block release. Address: a. The condition which has caused, or will cause, a work stoppage in the field. b. The impact on the mission if the emergency release is not made or is delayed beyond the requested release date.
22	Enter any special instructions that SSC/SSQM or SSC/SSQT must use to process this release.
23	List the data files required to test the programs being released. Include the reel numbers for tape files, and the project control numbers (PCNs) for all projects involved. If there is insufficient room, list the PCNs on an attachment. (If an attachments is used, do not list it in Block 18.)
24	Enter by volume the number of documentation pages to be released.
25	Self-explanatory. For emergency releases, obtain the signature of the releasing Director or his/her authorized representative.
26	Used at the discretion of the development agency.
27	Used at the discretion of the development agency.

Atch 6.1.1-5
AF Form 636

(This is a sample. See SSC/QIDM, 6-4021, for a hard copy)

Atch 6.1.1-5, Continued
AF Form 636

Atch 6.1.1-6
Quality Control Checklist

Purpose This attachment provides an example Quality Control Checklist for use during test and evaluation. This list is not all inclusive, and may differ by ADS. Ref(s): Adapted from SSCR 700-4, Vol II atch 7, 30 Oct 1987, change 1.

✓	Item
	1. Has documentation been created IAW the following regulations? a. AFR 5-1, paragraph 1-11a -- Policy and Procedures Letters b. AFR 5-1, paragraph 5-3 -- OPR Responsibility c. AFR 5-1, Chapter 8 -- Changes d. AFR 5-1, paragraph 6-2e -- Announcement of Manual Publication. e. MIL-STD-SDD -- Software User Manual (SUM), Computer Center Software Operator Manual (CCSOM) f. MIL-STD-SDD -- Software Installation Plan (SIP)
	2. Have the following data system requirements been met? a. AFR 700-9, Vol I -- Data elements current? b. AFR 700-9, Vol I -- CSAD up-to-date? c. AFR 700-9, Vol II -- AF Form 247 prepared?
	3. Does documentation meet the following specifications? a. File IDs documented properly? b. All program messages documented? c. Job setups correct? d. Programs' core sizes agree with documentation? e. Optional input/output files documented? f. Product Control Numbers and Report Control Symbols agree with programs' input and output? g. Input/output products agree with SUM?
	4. Does the release document, AF Form 636 or AFCC Form 2186, meet the following requirements? a. Entries correct? b. Attachments included? c. Programs captured on magnetic tape for SSQ use? d. Version dates agree with those of the captured programs? e. Test data achieves objectives for indicated program change(s)?
	5. Have the following standards been met IAW AFM 171-100, Vol I? a. Waivers requested and approved? (Section 1) b. Interfacing agencies notified of changes(s)? (Section B) c. Supporting documents current and available in the project folder? (Sections 11 & 12) d. Testing accomplished? (Section 13)

continued on next page ...

✓	Item
	6. Have the following system control standards been met IAW AFM 171-100? (Note: OPRs are encouraged to use log analyzer (LA) in their analysis.)

	VOL I	VOL II	VOL III
a. System ID correct?		Sec 2	Sec 2
b. Program ID correct?		Sec 2	Sec 2
c. Library ID correct?		Sec 2	Sec 2
d. File ID correct?		Sec 2	Sec 2
e. Report/Product IDs correct?		Sec 9	Sec 2
f. ECL/JCL card setups specified?		Sec 2	

7. Have the following design programming standards been met IAW AFM 171-100? (Note: OPRs are encouraged to use LA in their analysis.)

	VOL I	VOL II	VOL III
a. Minimum standard configuration used?		Sec 3	Sec 3
b. Core usage correct?	Sec 6	Sec 3	Sec 3
c. Disk usage correct?		Sec 3	Sec 3
d. Tape usage correct?		Sec 3	Sec 3
e. Console usage proper?		Sec 3	Sec 3
f. Remote usage proper?	Sec 6	Sec 3	Sec 3
g. Card reader usage correct?		Sec 3	Sec 3
h. Card punch usage correct?		Sec 3	Sec 3
i. Printer usage correct?	Sec 9	Sec 3	Sec 3
(1) Unclassified print format?	Sec 9		
(2) Classified Print format?	Sec 9		
j. Collating sequence correct?		Sec 3	Sec 3
k. Character set correct?	Sec 10	Sec 3	Sec 3
l. Proper program requirements used?	Sec 6	Sec 3	Sec 3
m. Language requirements proper?	Sec 7	Sec 3	Sec 3
n. Decision logic tables proper?	Sec 5		

8. Have the following quality control special interests been met?
   a. Was the system analyzed to optimize blocking factors and segment overlays?
   b. Will file sizes and program limits accommodate the largest anticipated workload?
   c. Have output products been reviewed for blank pages?
   d. Is test data adequate to test system?

Atch 6.2.1-1
Qualification Test and Evaluation II Procedures

Purpose This attachment provides example procedures for conducting Qualification Test and Evaluation II testing. Ref(s): Adapted from SSCR 700-4, Vol II para 3-17, 30 Oct 1987, change 1.

✓	Tasks	OPR
	1. Submit an QT&E-II prototype request letter to SSC/SS with the information shown in attachment 6.2.1-2 (Page 6-362) at least 90 days before the QT&E-II prototype test start date. SSC/SS will use this letter to request MAJCOM approval for participation of base/MAJCOM DPCs as QT&E-II test facilities. The OPR/OCR should perform preliminary functional area (MAJCOM and base) coordination before submitting an QT&E-II/prototype request. If The QT&E-II or prototype activity requires additional equipment, the QT&E-II/prototype request letter must be submitted in sufficient time to allow the test sites to concur with the test and acquire equipment prior to the test start date.	Project Office
	2. With the quality control activity, will select test locations(s). Coordinate with MAJCOMs to determine which locations(s) can support the functional test requirements.	Project Office
	3. Use the Quality Control Checklist as described in attachment 6.1.1-6 (Page 6-357) as a test aid.	Project Office
	4. Provide SSC/SS all software production release packages for testing 35 days before the QT&E-II start date. Provide test sites instructions for reporting difficulties (DIREP, telephone calls, message, etc.) and submitting QT&E-II software test reports (RCS: CSV-CDD(AR)7502) by message to provide timely, accurate results of QT&E-II progress. See attachment 6.2.1-3 (Page 6-363). Final software test reports are due at SSC/SS within 10 working days after test completion. QT&E-II/prototype packages will contain copies of all documentation for distribution to test sites for maximum orientation/preparation. For changes to existing manuals, type or stamp the word "Test" at the top of each page of documentation to ensure it will not be mistaken for operational documentation. Change pages and AF Form 636/AFCC Form 2186 should instruct test sites to retain official documentation being replaced by "test" documentation in case the QT&E-II is discontinued for any reason. For new or completely revised manuals, stamp "Test" only on the cover page.	Project Office
	5. Take corrective action and submit QT&E-II or recycled prototype packages when problems are reported from test sites via telephone, trouble calls, DIREPS, or QT&E-II reports.	Project Office

	6. Help SSC/SS document the weekly status of QT&E-II for the SSC Executive Director's review.	Project Office
	7. Do not compile and/or patch a source program at a test site except when authorized by SSC/SS. (This would be extremely rare.)	Project Office
	8. Do not permit copies of, or access to, source code at a test site by the test site personnel unless authorized by SSC/SS. (This would be extremely rare.)	Project Office

continued on next page ...

Atch 6.2.1-1, Continued
Qualification Test and Evaluation II Procedures

✓	Tasks	OPR
	9. Certify system development efforts which process sensitive data as directed in AFR 205-16 and SSCR 205-16.	Project Office
	10. Ensure that the QT&E-II/prototype request letter is properly coordinated and ensure selected test sites satisfy QT&E-II or prototype test objectives.	SSQ
	11. Test all software production packages before releasing them to test sites. Use the Quality Control Checklist (attachment 6.1.1-6 on page 6-357) as a testing aid. Complete QT&E or prototype recycle testing within 30 days after submission., and release the recycle package after successful testing. Forward a written report (AFCC Form 2234 and 2234A) to the systems coordinator for recycle testing. Evaluate and test emergency recycles and patches for QT&E-II/prototype tests before release to the test sites. Process patches within one work day and tape releases as soon as possible.	SSQ
	12. Review and approve the software test plan and release advance "test" documentation to the test sites before the initial QT&E-II release.	SSQ
	13. Monitor and evaluate QT&E-II or prototype progress using test DIREPS, test advisory notices, and written or oral reports. As a minimum, telephone all test sites weekly during the test.	SSQ
	14. Ensure that reports are received from test sites when appropriate.	SSQ
	15. Recommend to the OPR corrective action for problems identified at the test sites.	SSQ
	16. Ensure the QT&E-II script follows the system test plan.	SSQ
	17. Visit test sites to monitor and evaluate test progress when required, subject to approval of the SSC/SS director.	SSQ
	18. Make an independent evaluation and write a final system test document after completion of QT&E-II testing.	SSQ
	19. Maintain permanent history of QT&E-II test activity.	SSQ
	20. During this test, MAJCOM and/or base-level personnel from communications-computer systems and functional user activities will complete an independent evaluation with minimum assistance from SSC/SS. Document and correct all problems before submitting a block release package for operational release.	SSQ
	21. Complete Software Test Report (STR) and provide copies to the ADS manager.	SSQ

Atch 6.2.1-2
Qualification Test And Evaluation II And Prototype Request Procedures

Purpose This attachment provides instructions for submitting a QT&E-II or Prototype Request. Ref(s): Adapted from SSCR 700-4, Vol II atch 13, 30 Oct 1987, change 1

✓	Tasks
	QT&E-II and prototype requests must include the following information and must reach SSC/SSQ at least 90 days prior to the expected QT&E-II prototype test start date. The ADS manager should have coordinated previously with the MAJCOM functional area counterparts.
	a. System title.
	b. System code/DSD.
	c. Security classification.
	d. Management category assigned.
	e. Number of programs involved.
	f. Processing frequency.
	g. Supporting documentation, including the number of pages and estimated impact.
	h. List, in order of preference, bases that can support the test.
	i. Proposed start and ending date for QT&E-II turn-in, QT&E-II, FQR, and QT&E/Worldwide release.
	j. TDY support requirements: Number of personnel, their AFSCs, and the bases they will support.
	k. Copies of related correspondence with HQ USAF, MAJCOM, etc.
	l. Impact on the DPC:
	(1) Run times: Daily, weekly, monthly, etc.
	(2) File requirements (disk, tape, card, etc.).
	(3) Training requirements for DPC personnel.
	(4) Equipment required over minimum standard configuration.
	(5) Parallel processing requirement.
	m. Fall-back procedures.
	n. Desired date for worldwide implementation.
	o. System coordinator, telephone number, office symbol.
	p. Other information that would contribute to planning an QT&E-II/Prototype. Attachments to the request letter must include approved ADS requirements, communications-computer system directives, communications-computer system project plans, functional descriptions, AFCC Form 2185, and software test plan (as applicable).

Atch 6.2.1-3
QT&E-II Instructions For Difficulty Reporting And Evaluations

Purpose This attachment provides instructions for submitting difficulty reports and evaluations during QT&E-II. Ref(s): Adapted from SSCR 700-4, Vol II atch 14, 30 Oct 1987, change 1

✓	Tasks
	A QT&E-II Software Test Plan should include instructions for difficulty reporting and submitting software test reports. The following are sample entries.
	a. Difficulty Reporting. Difficulty reporting procedures are outlined in SSCR 171-12. Procedures for this test are as follows:
	(1) Trouble calls. SSC/SSF, the Field Assistance (FAB), (DSN 596-5771) has copies of the manuals for this test. The ADS manager should direct all inquiries to the FAB to ensure proper monitoring of the system's test progress. The test site DPC manager and functional user are responsible for contacting the FAB by telephone when problems are encountered. Use DIREPs (see paragraph (2) below) to describe test-related incidents even after trouble calls are made.
	(2) Difficulty Reports (DIREPs) (S1100). The DPC manager must submit DIREPs on an as-required basis when immediate corrective action is not required. Mark DIREPs "QT&E-II," since internal SSC/SS handling procedures for systems in QT&E-II differ from those for worldwide operational systems. Forward three copies of each DIREP to SSC/SSF.
	(3) Test Advisory Notices (TANs). TANs are those notices dispatched by HQ SSC/SS only to test bases for the system under test. The test bases will use them in the same way that System Advisory Notices (SANs) are used for systems operational Air Force-wide.
	b. QT&E-II Software Test Report (RCS: DSC-SSC(AR)7502). The final report will significantly impact the decision whether to release this test software as an operational system.
	(1) Frequency. Both the functional user and DPC manager should provide formal reports on QT&E-II to SSC/SSQ within 10 working days after test completion. The user or DPC manager may send earlier reports if problems exist which require immediate attention for the test to proceed. SSC/SSQ will contact each test site weekly to determine the system's latest status for briefings to the SSC Directors.
	(2) Content. This narrative report should cover system operability, program deficiencies, completeness of implementation/conversion procedures, documentation adequacy, impact of the system from operational and management viewpoints, and the ability of the system to support functional requirements.

Atch 6.3.1-1
Qualification Operational Test & Evaluation Procedures

Purpose This attachment provides instructions for supporting AFOTEC QOT&E testing.
Ref(s): AFOTECR 55-9, AFR 80-14, TO 00-35D-54

✓	Tasks
	Refer to the above references for guidance on supporting AFOTEC testing.

7.0

Acronyms, Definition of Terms, and Document References

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7.1 Acronyms

Introduction This section identifies acronyms used within the SEP.

ADPE	Automatic Data Processing Equipment
ADPS	Automatic Data Processing System
ADS	Automated Data System
AFDSRS	Air Force Defense Software Repository System
AEE	Application Execution Environment
AF-IRDS	Air Force Information Resources Dictionary System
AFM	Air Force Manual
AFOTEC	Air Force Operational Test and Evaluation Center
AFR	Air Force Regulation
AIS	Automated Information System
ATCH	Attachment
BCR	Baseline Change Request
BLISS	Base Level Integrated Support System
CAMPUS	Center Automated Manpower and Project Update System
CAMS	Core Automated Maintenance System
CASE	Computer Aided Software Engineering
CAT/FILE	Catalogue and or File Names
CCB	Configuration Control Board
CCSOM	Computer Center Software Operator Manual
CCSR	Communications-Computer System Requirement
CDR	Critical Design Review
CI	Configuration Item
CIIN	Configuration Item Identification Number
CM	Configuration Management
CMP	Configuration Management Plan
COOF	Comptroller Office of the Future
COTS	Commercial-Off-The-Shelf
CRLCMP	Computer Resources Life Cycle Management Plan
CSC	Computer Software Component///Customer Service Center
CSCI	Computer Software Configuration Item
CSRD	Communications-Computer Systems Requirements Document
CSU	Computer Software Unit
DAA	Design Approval Authority
DBDD	Database Design Document
DBMS	Database Management System
DCB	Design Control Board
DCS	Deputy Chief of Staff
DDN	Digital Data Network
DDRS	Defense Data Repository System
DID	Data Item Description
DIREP	Difficulty Report
DISA	Defense Information Systems Agency
DoD	Department of Defense

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Acronyms (Cont'd)

DPC	Data Processing Center
DPM	Deputy Program Manager
DSD	Data System Designator
DT&E	Development Test and Evaluation
ECL	Executive Control Language
ECP	Engineering Change Proposal
ED	Executive Director
FAB	Field Assistance Branch
FCA	Functional Configuration Audit
FD	Functional Description
FP	Function Point
FQR	Formal Qualification Review
FSEC	Federal Software Exchange Commission
FSM	Firmware Support Manual
HUMS	Heads Up Message
HWCI	Hardware Configuration Item
IAW	In accordance with
I-CASE	Integrated Computer Aided Software Engineering
ICWG	Interface Control Working Group
IDD	Interface Design Document
IEEE	Institute of Electrical and Electronics Engineering
ILSP	Integrated Logistics Support Plan
INFOCEN	Information Center
IRA	Interface Requirements Agreement
IRR	Initial Requirements Review
IRS	Interface Requirements Specifications
JCL	Job Control Language
JOCAS	Job Order Cost Accounting System
JRMET	Joint Reliability and Maintainability Evaluation Team
KLOC	Lines of Code by Thousands
KSLOC	Source Lines of Code by Thousands
LA	Log Analyzer
LAN	Local Area Network
LOC	Lines of Code
MAJCOM	Major Command
MIL-STD	Military Standard
MIP	Material Improvement Project
MNS	Mission Needs Statement
MRB	MIP Review Board
OCD	Operational Concept Document
OCR	Office of Collateral Responsibility
OPR	Office of Primary Responsibility
ORD	Operations Requirement Document
OTE	Operational Test Environment

continued on next page...

OT&E	Operational Test and Evaluation
PAN	Partial Advisory Notice
PCA	Physical Configuration Audit
PCE	Preliminary Cost Estimate
PCI	Product Configuration Identification
PDL	Program Design Language
PDR	Preliminary Design Review
PM	Program/Project Manager
PMD	Program Management Directive
PMO	Program Management Office
PMP	Program Management Plan
POC	Primary Office for Contact
POM	Program Objectives Memorandum
PQDR	Program Quality Discrepancy Reports
PSS	Project Summary Sheet
QA	Quality Assurance (synonymous with SQA)
QOT&E	Qualification Operational Test and Evaluation
QT&E	Qualification Test and Evaluation
Ref	Reference
RM	Requirements Management
RSA	Reusable Software Asset
RTM	Requirements Traceability Matrix
SANS	System Advisory Notices
SBLC	Standard Base Level Computer
SCCB	Software Configuration Control Board
SCM	Software Configuration Management
SCN	Specification Change Notice
SCS	Standard Communications-Computer Systems
SCTC	Small Computer Technical Center
SDD	Software Design Document
SDP	Software Development Plan
SDR	System Design Review
SEE	Software Engineering Environment
SEI	Software Engineering Institute
SEP	Software Engineering Process
SEPG	Software Engineering Process Group
SFR	Systems Functional Review
SMR	Special Management Review
SOA	Separate Operating Agency
SOW	Statement of Work
SPA	Software Process Assurance
SPAP	Software Process Assurance Plan
SPMS	Software Project Management System
SPT	Software Project Tracking
SPTO	Software Project Tracking and Oversight
SPP	Software Project Planning
SQA	Software Quality Assurance

continued on next page...

Acronyms (Cont'd)

SQC	Software Quality Council
SR	Software Release
SRR	System Requirements Review
SRS	Software Requirements Specification
SS	Subsystem Specifications
SSC	Standard Systems Center
SSC/OP	Director of Computer Operations
SSC/QID	Software Engineering Process Division
SSC/QIA	Software Process Assurance Division
SSCR	Standard Systems Center Regulation
SSC/RMB	Resource Management Business Office
SSC/RMF	Resource Management Financial Resources Division
SSC/SSB	Systems Software Division
SSC/SSQ	Quality Assurance Division
SSDD	System/Segment Design Document
SSP	Software Support Plan
SSR	Software Specification Review
SSS	System/Segment Specifications
ST	Software Testing
STD	Software Test Description
STP	Software Test Plan
SUM	Software User Manual
SVR	Systems Verification Review
TACE	Technical Analysis and Cost Estimate
TAN	Test Advisory Notice
TAR	Test Analysis Report
TDSB	Test Data Scoring Board
TEMP	Test and Evaluation Master Plan
TMO	Transportation Management Office
STP	Software Test Plan
TPWG	Test Plan Working Group
TQL	Total Quality Leadership
TRM	Technical Reference Model
TRR	Test Readiness Review
UDF	Unit Development Folder
WBS	Work Breakdown Structure
WPAFB OH	Wright Patterson Air Force Base, Ohio

7.2 Definition of Terms

Introduction This section defines terms used within the SEP.

Adaptive Maintenance - Software maintenance performed to make a computer program usable in a changed environment.

Allocated Baseline - In configuration management, the initial approved specifications governing the development of configuration items that are part of a higher level configuration item.

Allocated Configuration Item - In configuration management, the current approved specifications governing the development of configuration items that are part of a higher level configuration item (CI). Each specification (a) defines the functional characteristics that are allocated from those of the higher level CI, (b) establishes the tests required to demonstrate achievement of its allocated functional characteristics, (c) delineates necessary interface requirements with associated configuration items, and (d) establishes design constraints, if any.

Allocated Requirements - Subset of the system requirements that are to be implemented in the software components of the system.

American Standard Code for Information Interchange (ASCII) - The coded character set used for the general interchange of information among information processing systems, communication systems, and associated equipment.

Approval Authority (AA) - The AA is an individual authorized to commit resources to satisfy a requirement. An AA will be identified from each of the user and software support organizations for every validated requirement. AAs jointly approve official delivery schedules, version/release content, and changes to requirements, cost, and schedule.

Approved Requirement - A requirement that has received corporate agreement through an approval process on a technical solution to satisfy the validated requirement.

Audits - An independent examination of work products to assess compliance with specifications, standards, contractual agreements, or other criteria. See also Functional Configuration Audit and Physical Configuration Audit

Baseline - A specification or product that has been formally reviewed and agreed upon, that thereafter serves as the basis for further development, and that can be changed only through formal change and control procedures. (See also Allocated Baseline, Functional Baseline, and Product Baseline.)

Classes of Changes - Changes in configuration are controlled by classifying and processing changes as Class I or Class II changes.

Commercial Off The Shelf Software (COTS) - Commercially purchased, third-party software used to accomplish a specific function such as spread-sheets, word processing, utilities, and graphics.

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Compatibility - The ability of two or more systems or components to perform their required functions while sharing the same hardware and software environment. Also the ability of two or more systems or components to exchange information. Compare with "interoperability"

Compliance Terminology - The words "will", "shall", "must", and "required" are used to denote mandatory activities. The words "should", "could", "may", or "recommend" are used to denote recommended activities or alternatives not considered mandatory.

Computer Aided Software Engineering (CASE) - The use of computers to aid in the software engineering process. May include the application of software tools for software design, requirements tracing, code production, testing, document generation, and other software engineering activities.

Computer Resource Life Cycle Configuration Management Plan - The government plan for managing mission critical computer resources including software throughout a system's life.

Computer Software Component (CSC) - A functionally or logically distinct part of a Computer Software Configuration Item (CSCI), typically an aggregate of two of more software units.

Computer Software Configuration Item (CSCI) - An aggregation of software that is designed for configuration management and treated as a single entity in the configuration management process.

Computer Software Unit (CSU) - An element specified in the design of a CSC that is separately testable.

Configuration - In configuration management, the functional and/or physical characteristics of hardware/software as set forth in technical documentation and achieved in the product.

Configuration Control - A process of configuration management, consisting of the evaluation, coordination, approval or disapproval, and implementation of changes to configuration items after formal establishment of their configuration identification.

Configuration Control Board - A group of people responsible for evaluating and approving or disapproving proposed changes to configuration items (CIs), and for ensuring implementation of approved changes.

Configuration Identification - An element of configuration management, consisting of selecting the configuration items for a system and recording their functional and physical characteristics in technical documentation. Also, the current approved technical documentation for a configuration item as set forth in specifications, drawings, associated lists, and documents referenced therein.

Configuration Item (CI) - A collection of hardware or software elements treated as a unit for the purpose of configuration management.

Configuration Item Identification Number (CIIN) - A CIIN is the permanent number assigned by the design activity to identify a configuration item. A formal seven digit number is available.

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Configuration Management (CM) - The process of identifying and defining the configuration items in a system, controlling the release and change of these items throughout the system Life Cycle, recording and reporting the status of configuration items and change requests, and verifying the completeness and correctness of configuration items.

Configuration Management Plan (CMP) - Addresses each phase of the system Life Cycle and establishes the type of operation and any support agency interfaces. The CMP will use the Software Life Cycle Model (SLCM) outlined in the SCCC Paradigm guidebook, and uses the high-level flow diagram as the backbone of all planning and implementation. The high level flow diagram can be broken down into activities that are broken out into checklists and references for each individual activity. Each checklist guides the different individuals or groups through the tasks for that specific activity. The checklists are further expanded with detailed explanations for each item or task.

Configuration Reviews - Ensure technical understanding and visibility while verifying that the design satisfies the requirement. Reviews are part of the system engineering process, which is a logical sequence of activities and decisions for developing a communications-computer system.

Configuration Status Accounting - A process of configuration management, consisting of the recording and reporting of information needed to manage a configuration effectively. This information includes a listing of the approved configuration identification, the status of proposed changes to the configuration, and the implementation status of the approved changes.

Configuration Status Accounting and Reporting System - An automated database system that provides the Configuration Manager with both historical and current data related to system change activity.

Corrective Maintenance - Maintenance performed specifically to overcome existing faults.

Critical Design Review (CDR) - a review conducted: (1) to verify that the detailed design of one or more configuration items satisfies specified requirements; (2) to establish the compatibility among the configuration items and other items of equipment, facilities, software, and personnel; (3) to assess risk areas for each configuration item; and, as applicable, (4) to assess the results of producability analyses, review preliminary hardware product specifications, evaluate preliminary test planning, and evaluate the adequacy of preliminary operation and support documents.

Database Specification - Describes the database organization and storage allocation and provides the detailed data model of the logical and physical design, as well as other necessary information.

Design Control Board (DCB) - The Change Control Board established IAW AFR 14-1, to provide for proper change evaluation, processing, approval/disapproval, and implementation for each CI in the command centers major command and control systems.

Design Approval Authority (DAA) - The DAA is an individual authorized to commit resources to satisfy a requirement. A DAA will be identified from each of the user and software support organizations for every validated requirement. DAAs jointly approve official delivery schedules, version/release content, and changes to requirements, cost, and schedule.

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Development Test and Evaluation (DT&E) - The test and evaluation that allows the Air Force to demonstrate that system engineering design and development is complete, design risks have been minimized, and the system performs as required and specified. DT&E includes the test and evaluation of components, subsystems, hardware/software integration, associated software, and pre-production models of the systems.

Efficiency: (1) The degree to which the software performs its intended functions with minimum consumption of computer time and storage resources, (2) The extent to which software performs its intended functions with a minimum consumption of computing resources, (3) the amount of computing resources and code required by the program to perform its function.

Engineering Change - In configuration management, an alteration in the configuration of a configuration item or other designated item after formal establishment of its configuration identification.

Engineering Change Proposal (ECP) - In configuration management, a proposed engineering change and the documentation by which the change is described and suggested.

Flexibility - The ease with which a system or component can be modified for use in applications or environments other than those for which it was specifically designed.

Formal Qualification Review (FQR) - The test, inspection, or analytical process by which a group of configuration items comprising a system is verified to have met specific contractual performance requirements.

Functional Baseline - In configuration management, the initial approved technical documentation for a configuration item.

Functional Configuration Audit (FCA) - An audit conducted to verify: (1) that the development of a configuration item has been completed satisfactorily; (2) that the item has achieved the performance and functional characteristics specified in the functional or allocated configuration identification; (3) that its operational and support documents are complete and satisfactory.

Functional Description (FD) - Defines the system requirements which will serve as a basis for mutual understanding between the user and developer.

Inspections - A static analysis technique that relies on visual examination of development products to detect errors, violations of development standards, and other problems. Types include code inspections and design inspection.

Integrity - The degree to which systems or components prevent unauthorized access to, or modification of, computer programs or data.

Interoperability - The ability of two or more systems to exchange information and to use the information that has been exchanged.

Interface Design Document (IDD) - Specifies the detailed design for one or more interfaces between one or more CSCIs and other configuration items or critical items.

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Maintainability - The ease with which a software system or component can be modified to correct faults, improve performance or other attributes, or adapt to changed environment. Also, the ease with which a hardware system or component can be retained in, or restored to, a state in which it can perform its required function.

Methodology - A defined approach or process for doing software development or portions of software development. Methodologies can be either Life Cycle or phase. Life Cycle refers to those methods that apply across the entire life of the software, from conception to death (i.e., the spiral software development method and the waterfall method). Phase refers to methods generally confined to a phase (or couple of phases) of the software Life Cycle, such as testing, requirements, and design methods (i.e., Structured Requirements Analysis, Object Oriented Design).

Migration System - An existing AIS, or a planned and approved AIS, that has been officially designated to support standard processes for a functional activity. Migration systems can be applicable DoD-wide or DoD Component-wide.

Office of Primary Responsibility (OPR) - An office or individual designated as the central point of contact for a specific task, project, etc.

Operations Manual - Provides computer control personnel and computer operators in an information processing center with a detailed operational description of the system and its associated environment.

Operational Baseline - See Baseline

Operational Test and Evaluation (OT&E) - The test and evaluation conducted to determine a system's operational effectiveness and suitability under realistic combat conditions and to determine if the minimum operational performance requirements as specified in the Operational Requirements Document have been satisfied.

Perfective Maintenance - Software maintenance performed to improve the performance, maintainability, or other attributes of a computer program.

Physical Configuration Audit (PCA) - An audit conducted to verify that a configuration item, as built, conforms to the technical documentation that defines it.

Preliminary Cost Estimate (PCE) - Initial rough estimate of resource requirements and schedule. This cost estimate will be updated after a complete requirements analysis/definition has been completed.

Preliminary Design Review (PDR) - A review conducted: (1) to evaluate the progress, technical adequacy, and risk resolution of the selected design approach for one or more configuration items; (2) to determine each design's compatibility with the requirements for the configuration item; (3) to evaluate the degree of definition and assess the technical risk associated with the selected manufacturing methods and processes; to establish the existence and compatibility of the physical and functional interfaces among the configuration items and other items of equipment, facilities, software and personnel; and, as applicable, (4) to evaluate the preliminary operational and support documents.

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Product Baseline - Established by verifying the product specifications.

Product Configuration Identification (PCI) - The current approved or conditionally approved technical documentation which defines the configuration of a CI during the production, operation, maintenance, and logistic support phases of its Life Cycle, and which prescribes (a) all necessary physical or form, fit and function characteristics of a CI, (b) the selected functional characteristics for production acceptance testing, and (c) the production acceptance tests.

Reliability: 1. The degree to which the software consistently performs its intended functions. 2. The probability that software will not cause the failure of a system for a specified time under specified conditions. The probability is a function of the inputs to and use of the system as well as a function of the existence of faults in the software. The inputs to the system determine whether existing faults, if any are encountered. 3. The ability of a program to perform a required function under stated conditions for a stated period of time. 4. The degree to which the software can be expected to consistently perform its intended function with precision and accuracy.

Requirement: 1. A condition of capability needed by the user to solve a problem or achieve an objective. 2. A stated need calling for a software solution, software support, or technical service.

Requirements Validation - The official confirmation by the submitting organization that a requirement is needed to satisfy or more effectively perform the mission.

Reusability: 1. The degree to which the software, documentation, object definition, etc., can be used in multiple applications. 2. The extent to which a program (or parts of a program) can be reused in other applications. This is related to the packaging and the scope of the functions that the program performs.

Reviews - Evaluations of software element(s) or project status to ascertain discrepancies from planned results and to recommend improvement. These evaluations follow a formal process (for example, management review process, work review process, inspection process, or walk through process).

Software Configuration Control Board (SCCB) - A committee formed to review all BCRs and CSRDs before submission for formal approval at the Design Control Board (DCB). The SCCB will also review work in progress in order to provide an update at the DCB.

Software Development Plan (SDP) - The formal set of plans used to produce, maintain, and enhance software. Usually made up of a set of phase methods combined with configuration management, project management, and quality assurance for an integrated Life Cycle.

Software Project Management System (SPMS) - The set of defined processes, standards, measurements, metrics, and tools used to manage software development/maintenance efforts.

Software Test Description (STD) - The test cases and test procedures necessary to perform testing of a Computer Software Configuration Item (CSCI), an integrated group of CSCIs or CSCIs/HWCIs, or a software system or segment.

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Software Test Plan (STP) - The test plan provides guidance for the management and technical effort necessary throughout the test period. It establishes a comprehensive test plan and communicates the nature and extent of the tests deemed necessary to provide a basis for evaluation of the system. It is used to coordinate an orderly schedule of events, a specification of equipment and organizational requirements, the methodology of testing, a list of materials to be delivered, and a schedule of user orientation. It provides a written record of the actual test inputs to exercise system limits and critical capabilities, the instructions to permit execution of tests, and the expected outputs.

Software Work Products - Any artifact created as part of defining, maintaining, or using a software process, including process descriptions, plans, procedures, computer programs, and associated documentation, which may or may not be intended for delivery to a customer or end user. Examples of software work products include plans, estimates, data on actual effort, corrective action documentation, and requirements documents.

Specification Change Notice (SCN) - A document used to propose, transmit, and record changes to a specification. In proposed form, prior to approval, the SCN supplies proposed changes in the text of each page.

Subsystem Specifications (SS) - The logical breakdown of a system into separate areas of responsibility, such as functions, where each breakdown is composed of a software unit or series of units (Computer Software Components (CSC)). It should be as detailed as possible concerning the environment and design elements in order to provide maximum guidance to the software design effort.

System Requirements Review (SRR) - The objective of this review is to ascertain the adequacy of the contractor's efforts in defining system requirements. It will be conducted when a significant portion of the system functional requirements has been established.

System/Segment Specifications (SSS) - Provides a detailed definition of the System/Subsystem functions. It documents details of the on-going analysis between the user's operational personnel and the appropriate development personnel. It defines in detail the interfaces with other systems and subsystems and the facilities to be used for accomplishing the interfaces.

Tailoring - The process by which specific requirements of selected specifications, standards, data item descriptors, and related documents are evaluated to determine the extent to which they are suitable for incorporation into the contractual documents being written as part of the contract for a CI, and the modification of these requirements to ensure each achieves an optimal balance between operational needs and cost.

Work Reviews - A series of system engineering activities by which the technical progress of a project is assessed relative to its technical and/or contractual requirements. The reviews provide a method for the contractor and government to determine that the development of a CI and its identification have met contract milestone requirements.

Technical Analysis and Cost Estimate (TACE) - A study to determine whether a requirement can be implemented with the current resources and technology.

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Test and Evaluation Master Plan (TEMP) - The primary document used to assess adequacy of planned DT&E. It contains a mission and/or system description, the required operational/technical characteristics, critical technical/operational issues, test management responsibilities, DT&E and OT&E outlines including objectives, and a test resource summary.

Testing - The effort required to ensure that the software performs its intended function.

Unit Development Folder (UDF) - This folder is designed to communicate information required to explain in detail, the design and maintenance for all modules of coding within a given coding unit. It will also provide the necessary guidelines and framework of reference to develop the next level or levels of detail within the coding unit.

Usability: 1. The effort required to learn the human interface with the software, to prepare input, and to interpret output of the software. 2. The relative effort for using software (training and operation).

Users Manual - A manual that completely describes the capabilities and functions of a system or software package. Ideally, it should provide the user with scenarios or examples.

Validation: 1. The process of evaluating software to determine compliance with specified requirements. 2. The process of evaluating software at the end of the software development process to ensure compliance with the software requirements.

Validation Authority - An individual from the submitting agency, designated in writing, who has the authority to endorse a requirement as needed.

Validated Requirement - A requirement that has received corporate agreement with the need identified by the requirement and verified by a validation authority. A validated requirement is not automatically an approved requirement.

Verification: 1. The process of evaluating the products of a given software activity to determine correctness and consistency with respect to the products and standards provided as input to that activity. 2. The process of determining whether or not the products of a given phase of the software development cycle fulfill the requirements established during the previous phase. 3. The act of reviewing, inspecting, testing, checking, auditing, or otherwise establishing and documenting whether or not items, processes, services, or documents conform to specified requirements.

Version - A change to a baseline configuration item that modifies its functional capabilities. As functional capabilities are added to, modified within, or deleted from a baseline configuration item, its version identifier changes.

Version Description Document - This data item is used to accompany changes to an approved and released computer program. Its purpose is to identify the changes made and the exact version of a computer program to be delivered.

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Waiver - A written authorization to accept a configuration item or other designated items, which, during production or after having been submitted for inspection, are found to depart from specified requirements, but nevertheless are considered suitable for use "as is" or after rework by an approved method. Also, the written authorization to deviate from the SSC Standard Processes defined in this document.

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7.3 Document Reference List

Introduction This section identifies all documents referenced within the SEP.

AFM 171-100	Automatic Data Processing Systems and Procedures
AFM 171-100 (Vol I)	Automated Data Systems (ADS) Standards
AFM 171-100 (Vol II)	Automated Data Systems (ADS) Standards - H6000 Series
AFM 171-100 (Vol V)	Automated Data Systems (ADS) Series ADP
AFM 171-100 (Vol VI)	Development and Documentation of Automated Data Systems (ADS) - Small Computer
AFM 171-100 (Vol VIII)	Automated Data Systems (ADS) Standard Multi-user Small Computer Requirements Contract (SMSCRC) System
AFM 171-103	Management Support System (MSS)
AFM 171-110 (Vol I)	U1100 Technical Information Manual (TIM), DPC Management
AFM 171-530 (Vol I/II)	Base Level Integrated Support System (BLISS)

AFOTECR 55-9	Management of Operational Test and Evaluation

AFP 172-4	Air Force Budget Process

AFPD 33-2	C4 Systems Security

AFR 5-1	Air Force Publications Management Program
AFR 14-1	Configuration Management
AFR 55-43	Management of Operational Test and Evaluation
AFR 80-14	Test and Evaluation
AFR 205-16	Communications-Computer security procedures and responsibilities
AFR 700-4, Vol II	Communications-Computer Systems Acquisition and Major Automated Information Systems Review Requirements
AFR 700-9 (Vol I)	Information Systems Standardization Program
AFR 700-9 (Vol II)	Information Systems Data Element Standardization and Management Program

AFR 800-2	Acquisition Program Management

AF Supplement to DoDI 5000.2 - Acquisition Management Policies and Procedures

AFSSI 5001	Systems Security Policy Generation

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Document Reference List (Cont'd)

AFSSI 5102	Computer Security for Operational Systems
AFSSM 5018	Air Force Systems Security Memorandum

DoD 5000 series	Defense Acquisition

DoD-STD 480B	Configuration Control, Engineering Changes, Deviations and Waivers
DoD 5200.28	Security Requirements for Automated Information Systems
DoD-7045.7	Implementation of PPBS
DoD 8020.1-M (draft)	Functional Process Improvement
DoD 8320.1-M (draft)	Data Administration Procedures, Dated: 15 Dec 92
DoD 8320.1-M-1	Data Element Standardization Procedures, Dated: Jan 93
DoDI 5000.2	Defense Acquisition Management Policies and Procedures
DoDD 5000.2M	Defense Acquisition Management Documentation and Reports
DoDI 7041.3	Economic Analysis and Program Evaluation for Resource Management
DoDI-7920.4	Baselining of Automated Information Systems

HQ Operating Instruction 800-2 - Program Management Directive Guidance

MIL-HDBK-245B	Preparation of Statement of Work (SOW)

MIL-STD-SDD	Software Development and Documentation

MIL-STD-483A	Configuration Management Practices for Systems, Equipment, Munitions, and Computer Programs
MIL-STD-881B	Work Breakdown Structures for Defense Materiel Items
MIL-STD-973	Configuration Management
MIL-STD 1521B	Technical Reviews and Audits for Systems, Equipment, and Computer Software
MIL-STD-1815A	Ada Programming Language

MIL-STD-2167A	Defense System Software Development

SEI-93-TR-6	"Taxonomy-Based Risk Identification", Technical Report Software Engineering Institute, Pittsburgh, PA, June 1993
SSCR 171-12	Automated Data Processing Systems

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Document Reference List (Cont'd)

SSCR 205-16	Communications-Computer Security Policy, Procedures, and Responsibilities
SSCR 700-3	Communications-Computer System Requirements Documentation, Analysis, and Approval
SSCR 700-4 (Vol II)	SSC Automated Data Systems Production Process
SSCR 700-10	Graphical User Interface Standards

TO 00-35D-54	USAF Materiel Deficiency Reporting and Investigating System

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7.4 Document Cross-Reference Table

Introduction This section identifies all references to documents identified within the SEP.

Item	Reference
Baseline Change Request (BCR)	AFR 700-4, Vol II
Computer Center Software Operator Manual (CCSOM)	MIL-STD-SDD
Computer Resources Life Cycle Management Plan (CRLCMP)	AF Supplement 1 to DoDI 5000.2
Configuration Management (CM)	MIL-STD-973
Configuration Management Plan (CMP)	MIL-STD-973, AFR 14-1, MIL-STD-483A
Communications-Computer System Requirement Document (CSRD)	SSCR 700-3
Database Design Document (DBDD)	MIL-STD-SDD
Engineering Change Proposal (ECP)	MIL-STD-973, DoD-STD-480B
Functional Configuration Audit (FCA)	MIL-STD-973, MIL-STD-1521B
Functional Economic Analysis (FEA)	AFR 173-15, DoD 8020.1-M, DoDI 7041.3
Formal Qualification Review (FQR)	MIL-STD-1521B
Firmware Support Manual (FSM)	MIL-STD-SDD
Interface Design Document (IDD)	MIL-STD-SDD
Integrated Logistics Support Plan (ILSP)	DoDI 5000.2
Internal Requirements Review (IRR)	SSCR 700-3
Interface Requirements Specifications (IRS)	MIL-STD-SDD
Joint Reliability and Maintainability Evaluation Team (JRMET)	AFOTECR 55-9, AFR 80-14, TO 00-35D-54
Material Improvement Project (MIP)	TO 00-35D-54
Mission Needs Statement (MNS)	DoDI 5000.2
MIP Review Board (MRB)	AFOTECR 55-9, AFR 80-14, TO 00-35D-54
Operational Concept Document (OCD)	MIL-STD-SDD
Operations Requirement Document (ORD)	DoD Manual 5000.2-M
Operational Test and Evaluation (OT&E)	AFOTECR 55-9
Physical Configuration Audit (PCA)	MIL-STD-973, MIL-STD-1521B

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Document Cross-Reference Table, (Cont'd)

Item	Reference
Program Management Directive (PMD)	SSCR 700-3, HQ Operating Instruction 800-2
Program Management Plan (PMP)	AFR 800-2
Program Objectives Memorandum (POM)	AFP 172-4, DoD-STD-7045.7
Program Quality Discrepancy Reports (PQDR)	TO 00-35D-54
Qualification Operational Test and Evaluation (QOT&E)	AFR 80-14
Qualification Test and Evaluation (QT&E)	AFR 80-14
Specification Change Notice (SCN)	MIL-STD-973, DoD-STD-480B
Software Design Document (SDD)	MIL-STD-SDD
Software Development Plan (SDP)	MIL-STD-SDD
Software Design Review (SDR)	MIL-STD-1521B
Systems Functional Review (SFR)	MIL-STD-1521B
Special Management Review (SMR)	MIL-STD-1521B
Statement of Work (SOW)	MIL-HDBK-245B
System Requirements Review (SRR)	MIL-STD-1521B
Software Requirements Specification (SRS)	MIL-STD-SDD
System/Segment Design Document (SSDD)	MIL-STD-SDD
Software Support Plan (SSP)	MIL-STD-SDD
Software Specification Review (SSR)	MIL-STD-1521B
System/Segment Specifications (SSS)	MIL-STD-SDD
Software Test Description (STD)	MIL-STD-SDD
Software Test Plan (STP)	MIL-STD-SDD
Software User Manual (SUM)	MIL-STD-SDD
Test Data Scoring Board (TDSB)	AFOTECR 55-9
Test and Evaluation Master Plan (TEMP)	DoDD 5000.2M, Part 7
Test Plan Working Group (TPWG)	AFR 80-14
Test Readiness Review (TRR)	MIL-STD-1521B
Work Breakdown Structure (WBS)	MIL-STD-881B

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Appendices

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Appendix A

Review Procedures

Review Procedures Overview

Overview

The following reviews are conducted at the completion of each software engineering process (Need Analysis, Project Planning, System Requirements/Design, Software Requirements Analysis, Software Design, Code and Test, QT&E I, QT&E II, QOT&E, and Product Release). The purpose of these reviews is described as follows:

	Work Review
	A Work Review is conducted to perform an in-depth analysis of documents developed during each of the software engineering processes. This review should surface errors and issues, but will not necessarily correct them. The focus for this review is technical rather than editorial. This review is conducted approximately two weeks before the formal review and is critical to ensure that each document is ready to be baselined. The Work Review focuses on the technical perspective, not on functional requirements. If appropriate, a functional review may be desired during this same time period. A Work Review team will be established to evaluate these documents. A primary and alternate representative should be identified. This team must be established early in the life cycle. The proposed baselined document is submitted to each team member with a letter directing what areas each should focus on. A chairman should be elected from the proposed Work Review team; this should not be the same person each time. The review team should be sized in relationship to the size of your project. The chairman will identify someone to record minutes and action items. The chairman is also responsible for keeping the meeting on track and ensuring everyone understands their role; he will also present the findings at the upcoming formal review. These findings should state that the document is one of the following: (a) ready for baseline; (b) ready to baseline with changes; (c) or, not ready for baseline because the team cannot reach a consensus or too many corrections required. If the technical team feels that the document cannot be baselined at this point, the chairman will discuss this with the program manager who will either proceed with the management review or delay.

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Review Procedures Overview, Continued

Overview, (Cont'd)

	Management Review
	Management reviews obtain senior-level management's approval/disapproval of the technical Review Team's findings. Time needed for a review should range from one to two hours. Emphasis should be to hold the review to as short a time as possible. The review focuses on the project status and covers a summary of information from the Work Review as well as detailed information on unresolved issues surfaced at the Work Review . If additional information is required, prepare a background package for senior managers to take with them. The review should be scaled according to the size of the program. For large projects this review is normally co-chaired by a senior manager and the OPR for the system or the OPR's representative. Invitees are at the discretion of the program managers. A presentation request must be completed to invite senior managers to attend and participate in the formal review. This provides them with background information on the type of people will be there, and what we expect from them. The OPR must sign a Project Summary Sheet stating whether to proceed or make changes. A suggested grouping would be anyone that has a stake in your system; (preferably keep it at a higher level (2-letters, 3-letters)), and a representative from the Software Process Assurance Group (SPAG).

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Overview, (Cont'd)

	Program/Special Management Reviews
	The Program/Special Management Reviews (PMR/SMR) are periodic reviews of the status of all programs/projects within the SSC. The PMR/SMR enables the approval official or other management officials to review the status of a software production effort at any time in the production process. At this review, the Program/Project Manager (PM) presents total program/project status to the Air Force functional OPR and the user community, and identifies elements of the program where progress is not in accordance with plans. Conduct a SMR when an economic analysis reveals that costs between milestones exceed projected costs by 15 percent; scheduled milestones slip by 120 days; or, additional manpower is needed over and above that specified in the last validation review. Conduct a PMR to provide senior management with a regularly scheduled status review of a program including major milestone approval. Each review is chaired by the command section and the review panel will be the SSC two letters. A SMR is conducted two times per year unless otherwise requested by the command section. A PMR is scheduled as needed. SSC/SSPP, with cooperation of the PM, schedules the PMR/SMR. SSC two letters nominate the next program/project to be reviewed. The review content is determined by the program/project office who ensures that the presentation will include all pertinent information to adequately communicate the true status of the program/project. The program/project office takes minutes and tracks assigned action items. Since this is only a review of current status, a technical support staff need not assist the command section at this review. However, technical specialists from various support activities (i.e., software process assurance, system software, security, systems management, system engineering, architecture and integration, and software modernization) should be encouraged to attend.

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Review Procedures Overview, Continued

Overview, (Cont'd)

	Initial Requirements Review
	The purpose of the Initial Requiments Review (IRR) is to ensure all logical participants have been identified and given an opportunity to assess the requirement, present problems (with solutions) that might obstruct the successful implementation of the requirement, provide management visibility, commit SSC resources, and turn the requirement over to the appropriate implementing organization. The IRR is performed after the requirement has been validated and prioritized by the functional OPR or appropriate validation authority. The IRR is conducted IAW procedures outlined in SSCR 700-3 which calls for formal or informal IRRs depending on the system size and management category. Upon successful completion of the IRR, the approval official will sign the requirement/management document (such as the CSRD or CSD) verifying that all matters have been resolved and the requirement is ready to be allocated with resources.
	System Requirements Review
	The primary objective of the System Requirements Review (SRR) is to ascertain the adequacy of the system requirements definition effort. The SRR is conducted normally during the system Concept Exploration or Demonstration and Validation phase after a significant portion of the system functional requirements has been established. This is normally after functional analysis and preliminary requirements allocation to determine initial direction and progress of the contractor's System Engineering Management effort and assess whether an optimum and complete configuration is probable. The total System Engineering Management activity is reviewed for responsiveness to the Statement of Work and system/segment requirements. Details for conducting the review are found in MIL-STD-1521B, Appendix A.

continued on next page...

Review Procedures Overview, Continued

Overview, (Cont'd)

	System Design Review
	The purpose of the System Design Review (SDR) is to evaluate the optimization, traceability, correlation, completeness, and the risk of the allocated requirements, including the corresponding test requirements, in fulfilling the system/segment requirements. The SDR is the final review before proceeding with preliminary design of HWCIs and detailed requirements analysis for CSCIs. The SDR encompasses the total system requirements (i.e., operations / maintenance / test / training hardware, software, facilities, personnel, preliminary logistic support considerations etc). Included in the review is a summary of the System Engineering Management activities to include mission and requirements analysis, functional analysis, requirements allocation, manufacturing methods/process selection, program risk analysis, system/cost effectiveness analysis, logistics support analysis, trade studies, intra- and inter-system interface studies, integrated test planning, specialty discipline studies, and configuration management. The SDR shall produce a technical understanding of the validity and degree of completeness of: the System/Segment Specifications, engineering design/cost of the system, preliminary Operational Concept Document, preliminary Software Requirements Specifications, and the preliminary Interface Requirements Specifications.
	Software Specification Review
	The Software Specification Review (SSR) is a formal review of a CSCI's requirements as specified in the Software Requirements Specification and the Interface Requirements Specifications. The SSR is normally conducted after the System Design Review but prior to the start of CSCI preliminary design. A collective SSR for a group of configuration items (treating each configuration item individually) may be conducted when such an approach is considered advantageous to the contracting agency. The purpose of the SSR is to establish the allocated baseline for preliminary CSCI design by demonstrating the adequacy of the Software Requirements Specifications (SRS), Interface Requirements Specifications (IRS), and Operational Concept Document (OCD).

continued on next page...

Review Procedures Overview, Continued

Overview, (Cont'd)

	Preliminary Design Review
	The Preliminary Design Review (PDR) is a formal Work Review of the basic design approach for a configuration item or for a functionally related group of configuration items. A collective PDR for a group of configuration items (treating each configuration item individually) may be conducted when such an approach is considered advantageous to the contracting agency. The PDR is conducted prior to the start of detailed design, but after completion of: the hardware development specifications, the Software Architectural Design (SAD), the Software Test Plan (STP), and the HWCI Test Plan. Other items that should be available for this review are preliminary versions of: the Computer Center Software Operator Manual (CCSOM) and the Software User's Manual (SUM). The overall technical program risks associated with each configuration item shall also be reviewed on a technical, cost, and schedule basis. A technical understanding shall be reached on the validity and the degree of completeness of the SAD, HWCI Test Plan, STP, and the preliminary versions of the CCSOM, SUM.
	Critical Design Review
	The Critical Design Review (CDR) is conducted on each configuration item prior to fabrication/production/coding release to ensure that the detail design solutions, as reflected in the Software Design Document (SDD), Data Base Design Document (DBDD), Interface Design Document (IDD), and engineering drawings that satisfy requirements established by the hardware development specification. Prior to the CDR, the following items should have been updated or completed: (CCSOM) and (SUM). For extraordinarily large complex configuration items, the CDR may be conducted on an incremental basis, i.e., progress reviews versus a single CDR. A technical understanding shall be reached on the validity and degree of completeness of: the SDD, IDD, DBDD, as well as preliminary versions of the CCSOM, SUM and the STP.

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Review Procedures Overview, Continued

Overview, (Cont'd)

	Test Readiness Review
	The Test Readiness Review (TRR) is a formal review of the contractor's readiness to begin formal CSCI testing. The TRR is conducted after software test procedures are available and CSC integration testing is complete. The purpose of the TRR is for the contracting agency to determine whether the contractor is in fact ready to begin CSCI testing. A technical understanding shall be reached on the informal test results, and on the validity and the degree of completeness of the Computer Center Software Operator Manual (CCSOM), and the Software User's Manual (SUM). Sample items to be reviewed are: requirements changes, design changes, software test plans and descriptions, software test procedures, CSC integration test cases, procedures, and results.
	Formal Qualification Review
	The objectives of the Formal Qualification Review (FQR) are: to ensure the completed software development products comply with all requirements and standards; to verify that the actual performance of configuration items, as determined through tests, comply with the Hardware Development Specification, Software Requirements and Interface Requirements Specifications; to identify the test report(s)/data which document results of configuration item qualification tests; and to obtain approval for operational release. When feasible, the FQR may be combined with the Functional Configuration Audit (FCA) at the end of configuration item/subsystem testing, and prior to the Physical Configuration Audit (PCA). If sufficient test results are not available at the FCA to ensure the configuration items will perform in their system environment, the FQR may be delayed until the necessary tests have been successfully completed to enable certification of configuration items, or as late as system testing. For non-combined FCA/FQRs, traceability, correlation, and completeness of the FQR shall be maintained with the FCA; avoiding duplication of effort. Approval at the conclusion of the FQR establishes the product baseline. All changes received from this point will be in the form of a DIREP, trouble report, or new requirements document.

continued on next page...

Review Procedures Overview, Continued

Overview, (Cont'd)

	Peer Review
	The purpose of the Peer Review is to remove defects from software work products early and efficiently and to develop a better understanding of the software work products and the potential defects that might be prevented. The Peer Review is a methodical examination of the coded software by the producer's peers to identify defects and areas where efficiency improvements are needed. Two primary accomplishments of the Peer Review are: (1) system logic and program logic are reviewed in detail by a technician other than the originator, and (2) the originator of the logic has the benefit of other technicians' experience and knowledge. Both should ensure good practices and techniques have been employed and that sound, efficient software has been produced which is easily modifiable and maintainable.

Develop & Distribute Review Package

Procedures The following table outlines the procedures necessary in preparing for a review.

Step	Procedures
1	Identify review objective. (See Checklist-1)
2	Identify review participates. (Contact SSC/SSPP for assistance)
3	Schedule facilities.
4	Identify meeting logistics. (Date, time, location)
5	Notify review participates/panel members.
6	Outline meeting guidelines and develop an agenda. (See Sample-A1)
7	Develop slides complying with standard format. (Contact SSC/RMMI)
8	Develop and distribute review package to participates/panel members. (Minimum 1 week prior to review)

Checklist-1

Description The following actions are a summation of tasks that may be accomplished to determine if requirements have been satisfied during the process of identifying the objective of the review and determining whether the appropriate review can be accomplished.

✓	Action
	Determine the purpose for the review.
	Determine if sufficient funding is available.
	Determine the possibility of cost overruns.
	Determine if requirements alter the hardware and software architecture of the current system.
	Identify what must be evaluated to determine which user requirements are valid.
	Determine if user requirements are satisfied.
	Determine if scheduled milestone can be met.
	Determine if proper documentation is available.
	Identify any potential problems.
	Determine the appropriateness of the technical solution.
	Determine who is best qualified to speak on user requirements.
	Determine who is best qualified to speak from a system viewpoint.
	Determine how the user should present this case/findings.
	Determine who can best advise the chairman on the technical credibility of the presentations.
	Determine what questions should be answered by whom.

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Sample-A1

The Review Meeting Agenda

Definition

The agenda describes the format the review meeting will follow. It is used by the chairperson to keep the meeting structured and on time.

Audience

The agenda is distributed as part of the review package to the reviewers, chairperson, and recorder.

Agenda Items

The table below describes the agenda items of the review meeting and the rationale associated with each item.

Agenda Item	Description	Rationale
Introduction	The chairperson opens the meeting.	Ensures that the reviewers understand and follow the review guidelines. Also allows the chairperson to determine the readiness to proceed with the review.
Overview	The producer presents a brief overview of the product under review.	Provides the reviewers with the producers perspective of the product under review.
Raise Issues	The reviewers raise issues and concerns.	Allows reviewers the opportunity to communicate their issues to the producer.
Discuss Issues	Issues are discussed and summarized.	
Review Closure (Wrap-up)	The chairperson brings the review to closure.	Allow review participants to explicitly agree on the next steps for the product.

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Sample-A1, Continued

The Review Meeting Agenda

Agenda Items Guidelines

The following table provides further guidelines for each agenda item.

Agenda Item	Guidelines
Introduction	The Chairperson: • Introduces the participants • States the objective of the review • States any groundrules or guidelines • Requests each reviewer to comment on his/her state of readiness • Determines readiness to proceed with the meeting
Overviews	The producer provides the reviewers with his perspective of the product under review. Often this involved describing: • Intended audience of the product • The purpose of the product • Expected next step after the review
Raise issues	See the table below for guidelines.

Review Closure (Wrap-up)	The chairperson:
	• Ask each review for disposition
	  • proceed to next step with the product as is
	  • proceed to next step, but modify the product as per the issues raised
	  • modify the product as per issues raised and re-review
	• Summarizes responses and proposes next step
	• Thanks reviewers and recorder
	• Adjourns the meeting

Raised issues Guidelines

This table describes several ways to cover the material being reviewed.

Approach	Comment
Page at a time	This approach is useful when a detailed review is desired.
Logical section at a time	Same as above but has the advantage that physical page boundaries do not interfere with the coverage of the material.
Issue at a time	Useful for occasions where limited time is time is available and the intent is to identify high-level issues.
Global issues/local issues	Same as above but has the advantage to assure that all high-level issues are raised first.

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Conducting the Review Meeting

Procedures The following table outlines the steps in conducting a review meeting.

Step	Action	Performed by
1	Introduce participants	Chairperson
2	State review objective	Chairperson
3	State groundrules	Chairperson
4	Ask each reviewer if they are prepared to proceed with the review	Chairperson
5	Are the majority of reviewers prepared for the review? • If **yes**, go to Step 6 • If **no**, disposition is re-review and go to Step 15	Chairperson
6	Present overview of the product being reviewed	Producer
7	State review format (*The approach taken to cover the material being reviewed*). **Example:** Issues will be raised page by page.	Chairperson
8	Raise issue	Reviewer
9	Discuss issue	Producer and Reviewer
10	Summarize issue	Chairperson
11	Record issue	Recorder
12	Repeat Steps 7 through 10 until all issues have been raised OR time has run out	
13	Ask each reviewer for their disposition	Chairperson
14	Reach consensus on next step	Chairperson
15	Adjourn meeting	Chairperson

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Track, Address, and Publish Review Issues

Document & Distribute Review Minutes Package

Procedures

The table below outlines the procedures necessary in following-up on issues and concerns raised during a review.

✓	Procedures
	Develop a list of issues and concerns raised during the review meeting. (See Sample-A2)
	Identify and develop issue response list per issue requiring action/resolution. (See Sample-A3)
	Develop a revised copy
	Distribute review minutes package. (See Checklist-2)
	Develop and submit a written thanks to review participates/panel members.

Sample-A2

Issues Information List

Definition The issues list is a written description of all the issues and concerns that were raised during the review meeting.

Prepared The issues list is produced by the recorder.

Audience The issues list is distributed as part of the review minutes package to reviewers, chairperson, and recorder.

Content The following tables describes the information that must be captured for each issue.

Content	Description	Rationale
Issue Description	The statement of the issues as summarized by the chairperson.	To ensure that the issues are recorded accurately and consistently, only the summary of the issues provided by the chairperson should be recorded.
Issue (Product Reference)	The part of the product that the issue refers to. **Example:** For a local issue, this information would include the page, section, and paragraph number.	This information provides context about the issue. Also it tells the producer what must be modified should a change be warranted.
Reviewer Reference (POC)	The name of the reviewer that raised the issue.	This lets the producer know whom to contact should further discussion be warranted.

Template A template for the Issues Information List is provided on the next page.

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continued on next page ...

Sample-A2 Continued

Sample Sheet

Issues Information List

Issue Number: _____ **Date:** _____

Issue (Product Reference): _____

_____

_____

_____

_____

_____

Issue Description: _____

_____

_____

_____

_____

_____

POC/Office/Phone Number: _____

Sample-A3

Issues Response List

Definition

The issues response list is a written description of all the issues and concerns that were raised during the review meeting which required an additional action or further resolution.

Prepared

The issues response list is produced by the recorder.

Audience

The issues response list is distributed as part of the review minutes package to reviewers, chairperson, and recorder.

Content

The following table describes the information that must be captured for each issue.

Content	Description	Rationale
Issue (Product Reference)	The part of the product that the issue refers to. **Example:** For a local issue, this information would include the page, section, and paragraph number.	This information provides context about the issue. Also it tells the producer what must be modified should a change be warranted.
Issue Response	The action/resolution for each issue described in the issue list	This information documents the action(s) taken to resolve the issue.
Reviewer Reference (POC)	The name of the reviewer that raised the issue.	This lets the producer know whom to contact should further discussion be warranted.

Template

A template for the Issues Response List is provided on the next page.

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continued on next page ...

Sample-A3, Continued

Sample Sheet

Issues Response List

Issue Number: _____ **Date:** _____

Issue (Product Reference): _____

_____

_____

_____

_____

_____

Issue Response (Action): _____

_____

_____

_____

_____

_____

POC/Office/Phone Number: _____

Checklist-2

Review Minutes Package

Description The review minutes packages documents the review itself and any action taken as a result of the review.

Prepared by The review minutes package is prepared by the producer.

Audience The review minutes package is distributed to all review participants (reviewers, chairperson, and recorder).

Components The table below describes the contents of the review minutes package.

Component	Descriptions
Issues list	A written description of the issues that were raised during the review meeting
Issue response	The action/resolution for each issue described in the issues list
Results of the review	The actions to be taken as a result of the review. Note: This need not be a point by point response to each issue but should specify what is to be done next by whom.
Revised copy of the product	
Thank you	A written thanks to the reviewers, chairperson, and recorder.

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Appendix B

Tracking Process (JOCAS II)

(This is a handout. Contact SSC/QIDM, 6-4021, for a hard copy)

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Appendix C

Data Element Standardization

Data Standardization

Procedures The following table outlines the procedures necessary to construct data elements.

✓	Procedures
	• The following are guiding directives for constructing data elements: - DoD 8320.1-M (DRAFT) -- Data Administration Procedures, Dated: 15 Dec 92 - DoD 8320.1-M-1 -- Data Element Standardization Procedures, Dated: Jan 93
	• Data element developers should review: - Standard data elements in AF-IRDS (located at AFC4A, Scott AFB IL) - DDRS (located at DISA) Note: This should be done prior to developing new data elements. New data elements will be submitted to SSC/SSMS for review. Reuse is a high priority. Both AF-IRDS and DDRS are accessible over DDN, and require USERIDs and PASSWORDS.
	• Data element are submitted in three phases and must be accompanied with a data model (preferrably IDEFIX). • Data elements are submitted to SSC/SSMS in the following order: - Prime Objects (with the data model) - Generic Elements - Standard Data Elements • SSC/SSMS will forward data elements and the data model to AFC4A for Air Force approval, and for submission to DISA (DoD). Note: Worksheets are available from SSC/SSMS. SSC/SSMS reserves the right to reject data elements, and return rejected data elements to the developer for correction or additional information. SSC/SSMS will serve as the SSC liaison between data element developers and the AFC4A and/or DISA.

Appendix D

SEP Tailoring Guide

SEP Tailoring Worksheet Overview

Overview

The purpose for the Software Engineering Process (SEP) is to bring all processes within the Standard Systems Center (SSC) together under a single process that will provide guidance (or, in some cases, references to guidance) for all software environments (new development, maintenance (corrective, adaptive, perfective, preventive), small computer, mainframe, etc.), regardless of the project type or the current point in a project's life cycle. However, it should be clear that all activities in the SEP may not apply to every project or environment.

To allow for unique situations, we created a SEP "TAILORING WORKSHEET". The Tailoring Guide is a list of minimum activities that should apply to most projects. The worksheet lists all activities from each stage in the SEP, identified with a corresponding paragraph number.

Obviously there will be situations where particularly activities will have to be added that are not checked as "mandatory". Each program/project manager must ensure that all activities are given due consideration.

SEP Tailoring Worksheet

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
			NEED ANALYSIS	**4.1**	
	✓		Process Communications-Computer System Requirements Document (CSRD)	4.1.1	
	✓		- Submit CSRD to SSC/RMBT	4.1.1	
	✓		- Assign a Resource Management Project Officer	4.1.1	
	✓		- Initialize an ADS Folder	4.1.1	
✓	✓		All requirements (including PMDs, MNS, or ORDs) should be routed through the security office (SSC/RMMS).	4.1.1	
	✓		Conduct Program Start Review	4.1.1	
			Before starting the PSR:		
	✓		- Conduct Security Risk Assessment	4.1.1	

	✓		- Identify DAA	4.1.1	
	✓		- Discuss key issues with functional experts	4.1.1	
	✓		- Conduct a manpower assessment	4.1.1	
	✓		- Create a preliminary program schedule	4.1.1	
	✓		- Assess technology availability	4.1.1	
	✓		- Prepare a chart briefing using the ESC Training Guide charts as samples	4.1.1	
	✓		Start PSR: Composed of SSC command staff, key functional staff directors, and the user, to include a DAA representative.	4.1.1	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
	✓		- Program Manager briefs roundtable members on requirements, technology assessment, technical alternatives, cost and schedule baseline, and initial strategy	4.1.1	
			- Members advise on alternatives and issues based on their experience	4.1.1	
	✓		Obtain approval from SSC/ED/EV/EA to commit resources and proceed	4.1.1	
	✓		Develop Program Management Plan (PMP) (to include applicable plans in the Project Planning Perform Activity of the SEP)	AFR 800-2	
	✓		- Establish a lead DAA if not previously done	AFR 800-2	
	✓		Prepare Operational Concept Document (OCD)	Atch 4.1.1-1	
	✓		Perform S/W Reengineering Assmt	4.1.1	
			Review directives in Chapter 3 of SEP	3.3	
	✓		Identify lead base(s) for prototype and testing field (QOT&E-II)	4.1.1	
	✓		Include initial system security policy in the Operational Concept Document	4.1.1	
			Conduct needs analysis	4.1.1	
✓	✓		- Analyze Communications-Computer System Requirements Document (CSRD)	4.1.1	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
			- Conduct:		
✓	✓		-- Technical Analysis and Cost Estimate	4.1.1	
	✓		--- The Center technical director will review technical approach	4.1.1	
	✓		-- Operational Security Needs Analysis	4.1.1	
	✓		-- Domain Analysis	4.1.1	
			-- Risk Analysis:		
	✓		--- Technical	4.1.1	
	✓		--- Supportability	4.1.1	
			--- Programatic	4.1.1	
	✓		--- Cost and Schedule	4.1.1	
			-- Security Risk Analysis	4.1.1	
			-- In-house/Contractor Analysis	4.1.1	
			-- Lease/Purchase Analysis	4.1.1	
			-- Level of Effort Baseline	4.1.1	
			-- POM Documentation	4.1.1	
	✓		-- Impact on Existing Workload	4.1.1	
	✓		-- Identify SSC support facilities	4.1.1	
	✓		Conduct Work Review	4.1.2	
✓	✓		Update metric data	4.1.3	
	✓		Conduct Management Review (Initial Requirements Review)	4.1.4	
			PROJECT PLANNING	**4.2**	
✓	✓		Identify Resources	Atch 4.2.1-1	
	✓		Develop Project Manager Procedures	Atch 4.2.1-1	
✓	✓		Develop Estimates - Negotiate all estimates with affected groups	Atch 4.1.3-1	
✓	✓		Develop High-Level Schedule	Atch 4.2.1-2	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
✓	✓		Develop Detailed Schedule	Atch 4.2.1-3	
			Develop the following plans:		
	✓		- Software Development Plan	4.2.1	
			-- Considerations: Software Program Life Cycle Strategies; Rapid Prototyping, and Simulations	Appendix L 5.4.2-2	
	✓		-- Include system architecture	5.3.1-1	
	✓		-- Estimate effort and cost		
			-- Include a plan for site communication layouts, site preparation and facility security certification/accreditation		
			Identify logistics requirements	Appendix K	
	✓		- Software Configuration Management Plan	Appendix G	
	✓		- Software Process Assurance Plan	Appendix I	
	✓		- Test and Evaluation Master Plan	4.2.1	
			- Systems Training Plan	DoDI 5000.2	
	✓		- Computer Resources Life Cycle Management Plan	4.2.1	
	✓		- Integrated Logistic Support Plan	4.2.1	
	✓		- Software Support Plan	4.2.1	
			- System Security Plan	4.2.1	
			- Security Test and Evaluation Plan	4.2.1	
	✓		Draft Interface Requirements Agreement	5.1.1-1	
	✓		Conduct Work Review	4.2.2	
✓	✓		Update metric data	4.2.3	
	✓		Conduct Management Review (System Requirements Review)	4.2.4	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
			SYSTEM REQUIREMENT/DESIGN	**5.1**	
			Obtain training on requirements analysis.	Atch 5.1.1-1	
✓	✓		Identify and plan customer involvement.	Atch 5.1.1-1	
✓	✓		Coordinate activities with SSC support offices	Appendix E	
✓	✓		Review existing documentation/software.	Atch 5.1.1-1	
			Analyze problem domain analysis.	Atch 5.1.1-1	
			Conduct customer interview.	Atch 5.1.1-1	
			Conduct user surveys.	Atch 5.1.1-1	
			Identify and evaluate reusable system requirements	Appendix F	
	✓		Specify the requirements for the system or a segment of the system.	Atch 5.1.1-1	
	✓		Establish interface control working group (ICWG).	Atch 5.1.1-1	
	✓		Update Risk Analysis Document	Atch 5.1.1-1	
✓	✓		Update Software Development Plan	Atch 5.1.1-1	
	✓		Update Test and Evaluation Master Plan	DoDD 5000.2M, Part 7	
			Perform logistics support analysis - Update the CRLCMP and ILSP	Appendix K	
✓	✓		Research standard data elements and data standardization	Appendix C	
	✓		Complete Interface Requirements Agreement	Atch 5.1.1-1	
	✓		Develop System/Segment Design Document	MIL-STD-SDD	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
	✓		Develop System/Segment Specification	MIL-STD-SDD	
	✓		Develop Requirements Traceability Matrix	Atch 5.1.1-1	
			Draft the following:		
✓	✓		- Security Documents	Atch 5.4.2-3	
	✓		- Interface Requirement Specifications	MIL-STD-SDD	
	✓		- Software Requirements Specifications	MIL-STD-SDD	
	✓		Conduct Work Review	5.1.2	
✓	✓		Update metric data	5.1.3	
	✓		Conduct Management Review (System Design Review)	5.1.4	
	✓		Establish Functional Baseline	Appendix G	
			SOFTWARE REQUIREMENTS	**5.2**	
			Obtain training in software requirements methodology.	Atch 5.2.1-1	
✓	✓		Identify and plan customer involvement.	Atch 5.2.1-1	
✓	✓		Identify and evaluate reuse software	Appendix F	
	✓		Coordinate activities with SSC Support Office	Appendix E	
	✓		Review system requirements.	Atch 5.2.1-1	
			Develop prototypes as required.	Atch 5.2.1-1	
			Reuse the available software requirements.	Appendix F	
	✓		Complete Software Requirements Specifications	MIL-STD-SDD	
	✓		Complete Interface Requirements Specifications	MIL-STD-SDD	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
	✓		Update Test and Evaluation Master Plan	DoDD 5000.2M, Part 7	
✓	✓		Update Software Development Plan	MIL-STD-SDD	
	✓		Update Requirements Traceability Matrix	Atch 5.1.1-1	
			Identify and document method for verifying each software requirement:		
✓	✓		- Draft Software Test Plans	MIL-STD-SDD	
✓	✓		- Draft Software Test Description	MIL-STD-SDD	
	✓		- Test and Evaluation Master Plan	DoDD 5000.2M, Part 7	
✓			Submit a Baseline Change Request (BCR) to update the Software/System Specifications document as necessary.	Appendix G	
	✓		Conduct Work Review	5.2.2	
✓	✓		Update metric data	5.2.3	
			Conduct Management Review (Software Specification Review)	5.2.4	
	✓		Establish Allocated Baseline		
			SOFTWARE DESIGN	**5.3**	
			Obtain training for Design Methodology.	5.3.1-1	
	✓		Review SSC standards on design analysis.	5.3.1-1	
			Review system and software requirements document	Atch 5.3.1-1	
	✓		Update Architectural Design	Atch 5.3.1-1	
			Database Design:		
	✓		- Conceptual	Atch 5.3.1-1	
	✓		- Logical	Atch 5.3.1-1	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
	✓		- Physical	Atch 5.3.1-1	
			Detailed Design (software sub-components):		
✓	✓		- Data Structures	Atch 5.3.1-1	
✓	✓		- Algorithms	Atch 5.3.1-1	
✓	✓		- Control information	Atch 5.3.1-1	
✓	✓		Update Software Development Plan	MIL-STD-SDD	
	✓		Update Requirements Traceability Matrix	Atch 5.1.1-1	
	✓		Design Interface(s)	Atch 5.3.1-1	
			Develop Design Prototypes	Atch 5.3.1-1	
			Reuse available software design assets.	Appendix F	
			Periodically review and inspect the design.	Atch 5.3.1-1	
			Coordinate tasks with appropriate working group(s).	Atch 5.3.1-1	
✓	✓		Use standard data elements.	Appendix C	
			Develop/update the following documents:		
✓	✓		- Software Design Document	MIL-STD-SDD	
✓	✓		- Interface Design Document	MIL-STD-SDD	
✓	✓		- Database Design Document	MIL-STD-SDD	
✓	✓		- Computer Center Software Operator Manual (draft)	MIL-STD-SDD	
✓	✓		- Software Users Manual (draft)	MIL-STD-SDD	
✓	✓		- Software Test Plan (draft)	MIL-STD-SDD	
✓	✓		- Software Test Description /Cases(draft)	MIL-STD-SDD	
	✓		Conduct Work Review	5.3.2	
✓	✓		Update metric data	5.3.3	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
	✓		Conduct Management Review (Preliminary Design/Critical Design Reviews)	5.3.4	
			CODE AND TEST	**5.4**	
			Obtain training in code and testing methodology.	Atch 5.4.1-1	
			Prepare publication announcement.	Atch 5.4.1-1	
✓	✓		Identify and evaluate reusable code assets.	Atch 5.4.1-1	
✓	✓		Review Design and Requirements Documents	Atch 5.4.1-1	
✓	✓		Develop the source code	Atch 5.4.1-1	
✓	✓		Generate executables	Atch 5.4.1-1	
			Reuse code assets	Appendix F	
✓	✓		Perform testing	Atch 5.4.1-1	
			Reuse test assets	Appendix F	
			Develop Software Installation Plan	5.4.1	
			Establish software and/or documentation baseline.	5.4.1	
			Establish the priority of the release-emergency, block special.	5.4.1	
			Capture software, required release date, identify sites for QT&E-II. Create release document.	5.4.1	
			Identify the Difficulty Reports, Systems Advisory Notices etc. that are cleared by this release.	5.4.1	
			Collect test data, test scripts, expected outputs etc. required by the software test plan.	5.4.1	
			Collect the software onto magnetic media for tranmittal to SSQ.	5.4.1	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
			Update the following:		
✓	✓		- Software Test Plan	MIL-STD-SDD	
✓	✓		- Software Test Description	MIL-STD-SDD	
✓	✓		- Computer Center Software Operator Manual	MIL-STD-SDD	
✓	✓		- Software User Manual	MIL-STD-SDD	
	✓		- Requirements Traceabilility Matrix	Atch 5.1.1-1	
	✓		Conduct Work Review	5.4.2	
✓	✓		Update metric data	5.4.3	
	✓		Conduct Management Review	5.4.4	
✓	✓		Establish Product Baseline		
			Qualification Test & Evaluation I	**6.1**	
✓	✓		Prepare Test	Atch 6.1.1-2	
✓	✓		Test the Software	Atch 6.1.1-2	
✓	✓		Evaluate Documentation	Atch 6.1.1-2	
✓	✓		Software Test Report	Atch 6.1.1-2	
✓	✓		Conduct Work Review	6.1.2	
✓	✓		Update Project Indicators	6.1.3	
✓	✓		Conduct Management Review	6.1.4	
			Qualification Test & Evaluation II	**6.2**	
*	✓		Prepare Test	Atch 6.2.1-1	
*	✓		Select AF Sites	Atch 6.2.1-1	
*	✓		Provide Sites Test Material	Atch 6.2.1-1	
*	✓		Test the Software	Atch 6.2.1-1	
*	✓		Evaluate Documentation	Atch 6.2.1-1	
*	✓		Software Test Report	Atch 6.2.1-1	
*	✓		Conduct Work Review	6.2.2	
*	✓		Update Project Indicators	6.2.3	
*	✓		Conduct Management Review	6.2.4	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
			Qualification Operational Test & Evaluation	**6.3**	
	✓		Chair the Test Plan Working Group (TPWG)	Atch 6.3.1-1	
	✓		Chair the Joint Reliability and Maintainability Evaluation Team (JRMET)	Atch 6.3.1-1	
	✓		Chair the Material Improvement Project (MIP) Review Board (MRB)	Atch 6.3.1-1	
	✓		Provide Membership on the Test Data Scoring Board	Atch 6.3.1-1	
	✓		Conduct Work Review	6.3.2	
	✓		Update Project Indicators	6.3.3	
	✓		Conduct Management Review	6.3.4	
			Product Release	**6.4**	
✓	✓		Merge software	Atch 6.1.1-1	
✓	✓		Copy software	Atch 6.1.1-1	
✓	✓		Print documentation	Atch 6.1.1-1	
✓	✓		Prepare Cover Letter	Atch 6.1.1-1	
✓	✓		Assemble components	Atch 6.1.1-1	
✓	✓		Conduct Work Review	6.4.2	
✓	✓		Update Project Indicators	6.4.3	
✓	✓		Conduct Management Review (Release Review)	6.4.4	

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Appendix E

Support Organizations

Support Organizations

Functional Responsibility

This table outlines the various functions performed at the SSC and corresponding offices of primary responsibility.

Function	Office Symbol
Ada	SSC/SSB
Architecture	SSC/SSM
Budget	SSC/RMF
Civil Engineering	SSC/DE
Communications	SSC/SSD
Configuration Management	SSC/SSM
Contracting	SSC/PK
Costs	SSC/RMFC
DDN Connectivity	SSC/SSD
Defense Message Service	SSC/SSD
Fee For Service	SSC/RMFF
Field Assistance	SSC/SSF
I-CASE	SSC/SSI
Manpower	SSC/RMBR
Memorandum of Agreements and Support Agreements	SSC/RMB
Mini/Micro Computer and Life cycle management	SSC/SSM
National Guard and Reserve	SSC/RF
Operations Support	SSC/OPS
Program Objective Memorandum (POM)	SSC/RMF

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Support Organizations, Continued

Functional Responsibility (Cont'd)

Function	Office Symbol
Project Planning	SSC/SSM
Program Control	SSC/QIP
Quality Control (Testing)	SSC/SSQ
Readiness/Plans	SSC/RMMR
Release	SSC/SSQ
Requirements	SSC/RMB
Reuse/Repository (Domain Analysis)	SSC/SSB
Security	SSC/RMMS
Software Engineering Process Group	SSC/QID
Software Process Assurance Group	SSC/QIA
Standard Data Elements	SSC/SSPS
Systems Integration	SSC/SSM
Systems Software	SSC/SSB
Training	SSC/RMS

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Appendix F

Reusable Software Assets Consumption/Production

Reusable Software Asset Consumption/Production

Procedures

The following table outlines the software reusability procedures to be followed by all projects.

✓	Procedures
	Contact the SSC software reuse office to search the Air Force Defense Software Repository System (AFDSRS) for candidate reusable software assets.
	- If you do not have an account to access the AFDSRS database, you may establish an account by completing an Account Request form, Figure F-1, and submitting it to the software reuse office.
	- The software reuse office will provide instructions and guidelines for accessing the AFDSRS database.
	If you find any reusable software assets, capture all identification data and the exact location of each reusable software module for inclusion in the planning document.
	- Identify all documents that apply to the reusable software asset(s).
	If you do not find reusable software assets, you may proceed with software development.
	You must consider all new software development for reuse and incorporation into the AFDSRS.
	Provide a brief description of new software to the software reuse office.
	Follow the most current instructions as directed by the software reuse office.
	If the new software will be entered into the AFDSRS, you must prepare an abstract (Figure F-2) that describes the software.

Additional Information

Additional information can be obtained on-line in the following separate files in the AFDSRS library:

- Reusable Software Component Certification Guidelines for Ada Implementation Component Types
- Ada Quality and Style: Guidelines for Professional Programmers

NOTE: Figures F-1 and F-2 are not available on the LAN version of the SEP. Contact SSC/QIDM, 6-4021, for hard copies.

Figure F1

Figure F2

Figure F2, Continued

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Appendix G

Configuration Management (CM)

Configuration Management (CM)

	Procedures
	Traditionally, configuration management is used to control hardware and software. This paragraph addresses only configuration management of software. ADS managers are required to follow the configuration management principles as stated in AFR 14-1, MIL-STD-973, and MIL-STD-1521B. Configuration management is a structured process for controlling critical documents, functions, and code. This control is necessary to ensure the inputs on all three program parameters (cost, schedule, and technical) are assessed prior to approving a change to a baselined configuration. Configuration management discipline consists of five elements: Planning, identification, control, status accounting, and auditing. The degree to which these five elements are applied will depend on the job at hand. For example, new acquisitions on software production work will include all five elements whereas a small modification may use only identification and control. The program/ADS manager must make these decisions on a case-by-case basis. A description of the five elements is as follows:
	a. Configuration Management Plan (CMP). In order to be successful at doing configuration management, a plan of action must be prepared. The ADS manager will develop a Configuration Management Plan (CMP) according to MIL-STD-973 and AFR 14-1. An example of a generic government CMP is in Sample-G1 at the end of this Appendix. This plan must state what will be controlled, by whom, for what reason, and who must coordinate on and approve changes. The plans must also show how changes will be documented and processed for items (CSCIs) and those which are not CSCIs. A CMP must be developed for each ADS produced and/or maintained at SSC and will be used throughout the life cycle of the software system. For operational ADSs, it is permissible to develop a CMP for a logical group of ADSs or for each functional area where applicable rather than one for each ADS.

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Configuration Management (CM), Continued

	Procedures
	b. Configuration Identification. Identifying the CSCIs which require special attention is crucial for a successful program/project. This can be a difficult decision because exercising excessive project control can lead to inordinate amounts of resources and time being expended to complete the final product. Conversely, if too little control is used, then the risk of providing an inferior product is increased. Some factors to consider when identifying CSCIs are: criticality, high risk functions, new technology items, multiple users/functions/locations, highly interrelated computer programs, and where many changes are expected. For each CSCI, the FD and SS will be controlled by configuration management. However, for items below the system level (for example: subsystem specifications, program specifications, and/or code), the program/ADS manager must identify CSCIs which should be controlled. For some software systems it may be necessary to control a system at a lower level because of high production risk or because it has sensitive areas (for example: programs involving security, or those with fraud, waste, or abuse potential).
	c. Configuration Control. The purposes of Configuration Control are to provide management visibility, prevent unnecessary or marginal changes, establish change priorities, assume prompt actions are taken, and produce adequate documentation. Once system level documents and CSCIs are baselined, changes to them must be controlled. It should be noted here that controlling changes to the three baselines (functional, allocated, and product) are only part of Configuration Management (CM). CM also includes controlling changes to documents which may not be part of a formal baseline or controlling changes to documents long before they become part of a formal baseline. To avoid fragmentations of work during the production process, each change to a baseline CSCI must be reviewed and approved. This ensures that only authorized changes are made and that all participants are aware of them. To speed up the change approval process, changes are divided into Class I and Class II.

continued on next page...

Configuration Management (CM), Continued

	Procedures
	(1) Class I change. A computer software change shall be classified Class I when one or more of the factors listed below is affected: (a) The Functional or Allocated Baseline. (b) The approved Product Baseline including referenced documents that pertain to: 1. Performance including reliability, maintainability, correctness, efficiency, integrity, useability, testability, flexibility, portability, reusability, or interoperability, outside stated tolerance. 2. Interface characteristics (external to the CSCI). (c) Non-technical contractual provisions such as fees, incentives, cost to the Government, and guarantees or deliveries. (d) Other factors. These include Government furnished equipment, safety, other computer software, compatibility with support resources, trainers, or training devices/equipment, delivered operation and contracts, pre-set adjustments or schedules affecting operating limits or performance to such extent as to require assignment of a new software inventory number, skills, manning, training, biomedical factors or human engineering design. (2) Class II change. A change will be classified class II when it does not fall within the definition of a Class I. (3) Class I changes are approved by the project approval official or program manager and Class II by the ADS manager. A Configuration Control Board (CCB) will be used to approve Class I changes. It should be noted that baseline change requests are to be used only during the production process. If a change occurs in the Deployment and Operation Phase, a requirements document such as an CSRD must be submitted through the appropriate channels. The CMP should also specify the internal controls to be used for controlling documents which are not identified as CSCIs.

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	Procedures
	d. Configuration Status Accounting. The status accounting function provides traceability of the CSCI baselines and their changes. It also acts as a management tool for accomplishing all related tasks resulting from those changes. The accounting requirement is optional for Management Categories I and II but required for Management Category III. The organization responsible for production, modification, or support of a CSCI will determine the specific data elements, choice of record and report format, and actual record keeping in accordance with the provisions of MIL-STD-973 and AFR 14-1, Configuration Management.
	e. Configuration Auditing. (1) Functional Configuration Audit (FCA). a. The purpose of an FCA is to demonstrate that each CSCI was successfully tested and complies with the software and interface requirements of the functional requirement and design documents, and to perform a thorough technical examination of each CSCI and validate that all changes made to the software code of each CSCI, as a result of OT&E-I and/or OT&E-II, comply with all technical documentation. b. To conduct a FCA, the following inputs are required: 1. Functional requirements document such as the System/Segment Specification (SSS). 2. System Design Documents such as the Interface Requirement Specification (IRS), Operational Concept Document (OCD), and the Software Requirement Specification (SRS). 3. Test procedures such as the Software Test Description (STD) and the Software Test Plan (STP). 4. Test Analysis Reports from OT&E-I and OT&E-II. 5. Minutes of the TRR and all open action items from past reviews. 6. A copy of baseline and data base change requests with their associated status accounting records along with all design problem reports.

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	Procedures
	7. List of all tests scheduled to be performed. 8. Results of past tests performed. 9. Other input as specified by the functional requirements and planning documents. c. To conduct the FCA, instruct the audit team members on their responsibilities as outlined in the following paragraphs: 1. Review test procedures and results against test specifications and procedures. 2. Review analysis or simulations when specific parameters were not verifiable during CSCI testing. 3. Review internal documents to verify that there are records of the physical configuration or the version of the CSCI for which test data were recorded. 4. Analyze cases where CSCIs failed to pass quality assurance/requirements and determine why they failed. Ensure corrective actions have been taken. 5. Conduct tests and/or retests to assure quality of the product. 6. Obtain a briefing on each CSCI and discuss with the producer requirements that were not met, solutions to deficiencies, engineering change proposals incorporated and tested as well as those not tested, and CSCI testing in general to include problems as well as successes. 7. Audit formal test plans, procedures, and results for each CSCI and check for completeness and accuracy. Ensure that all discrepancies have been clearly corrected and documented. 8. Audit system evaluation documents to validate test accuracy and completeness. 9. Review all approved engineering change proposals to ensure they were technically incorporated and verified. 10. Review all operational and support manuals to ensure they are accurate and consistent.

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	Procedures
	11. Review all past formal review meeting minutes and verify that corrective actions required have been completed. 12. Review and validate CSCI interface requirements and testing. 13. Review data base requirements, storage allocations, data and timing, and sequencing characteristics for compliance with specified and designed requirements. d. A formal report is produced to document the FCA. (2) Physical Configuration Audit (PCA). a. The purpose of a PCA is to conduct a formal examination of each CSCI to ensure it meets all functional and physical requirements. To perform a thorough technical examination of each CSCI and validate that all changes made to the software code of each CSCI, as a result of OT&E-I and/or OT&E-II, comply with all technical documentation. b. To conduct a PCA, the following inputs are required: 1. Functional requirement doucment such as the System/Segment Specification (SSS). 2. List of both approved and outstanding changes to the CSCI. 3. Complete list of shortages in CSCI production. 4. Test procedures such as the Software Test Description (STD) and the Software Test Plan (STP). 5. Test Analysis Report. 6. Test results of all test performed. 7. Operator/programmer/user manuals such as the Maintenance Manual (MM), Computer Operation Manual (OM), and Users Manual (UM) or the Computer System Operator's Manual (CSOM), Firmware Support Manual (FSM), and the Software Users Manual (SUM).

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	Procedures
	8. Functional configuration audit report for each CSCI. 9. Findings/status of quality assurance programs. 10. All open action items from previous reviews. 11. Any other documentation as required by the audit team members. c. To conduct the PCA, audit the first article of each CSCI and establish an independent audit team and instruct them on their responsibilities which are basically outlined in the following paragraphs: 1. Review release records and procedures. Record in the minutes of the PCA the differences between the CSCI being audited and its configuration management records. 2. Review test plans, procedures and records as well as product specification records to ensure the product complies with its design requirements. 3. Ensure each CSCI's system evaluation documents are complete and properly formatted. 4. Ensure the discrepancies noted during the FCA on each CSCI have been corrected. 5. Ensure CSCI design descriptions properly reflect labels, references and data descriptions. 6. Ensure each CSCI design description is consistent. 7. Ensure all system documentation is complete and conforms to its data item descriptions. 8. Ensure that approval software coding standards have been used and documented. 9. Certify that each CSCI accepted has been built in accordance with the specifications. d. A formal report is produced to document the PCA.

Sample-G1

Generic Government Configuration Management Plan (CMP)

1. General

1.1. Scope. This document contains the format and content preparation instructions for the CMP required by MIL-STD-973. The information contained herein is intended for compliance by SSC government, as well as, contractor activities performing Configuration Management (CM).

1.2. Applicability. The provisions of this document apply whenever a CMP is required. Although the standard is geared toward contractors, the same CM requirements exist for SSC projects under the Software Engineering Process (SEP).

1.3. Tailoring of Requirements. The selection of the necessary configuration management requirements from MIL-STD-973 to be applied to a specific project will be tailored to suit the life-cycle phase, complexity, size, intended use (including joint and combined interoperability), mission criticality, and logistics support of the Configuration Items (CIs).

2. Applicable Documents

2.1. Government Documents. For the purpose of this document, tailor the list of documents in Section 2 of MIL-STD-973.

3. Definitions

3.1. Definitions Used In This Document. For the purpose of this document, the definitions contained in Section 3 of MIL-STD-973 shall apply.

3.2. Terms Used In This Document. For the purposes of this document the terms System Program Office (SPO), Program Management Office (PMO), Project Office (PO), Automated Data System Office (ADSO and Automated Information Systems Office (AISO) are considered the same.

4. General Requirements

4.1. Content And Format Instructions. The plan shall be prepared on hard copy and/or electronic media using an SSC standard word processor. If a paragraph or subparagraph is tailored out, the following statement shall be added directly following the heading: "This section (or paragraph or subparagraph, as applicable) has been tailored out."

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Sample-G1, Continued

Generic Government CMP

4.2. <u>Organization Of The Document</u>. The plan shall consist of the following:

Cover Page
Record of Reviews and History page
Table of Contents
Section 1. Introduction
Section 2. Reference Documents
Section 3. Organization
Section 4. Configuration Management Phasing and Milestones
Section 5. Data Management
Section 6. Configuration Identification
Section 7. Interface Management
Section 8. Configuration Control
Section 9. Configuration Status Accounting
Section 10. Configuration Audits
Section 11. Contractor Control

5. Detailed Requirements

5.1. <u>Content And Format</u>. The content and format of the plan shall conform to the following paragraphs.

5.1.1. <u>Cover Page</u>. These words shall appear in the following format:

GOVERNMENT

CONFIGURATION MANAGEMENT PLAN (CMP)

for the

[Project Name or Configuration Item (CI) nomenclature and number]

[Date of document - day month year]

5.1.2. <u>Record of Review And History Page</u>. This page shall include the review and approval dates of all changes to the plan.

5.1.3. <u>Table Of Contents</u>. The Table of Contents shall list the title and page number of all titled paragraphs and subparagraphs. The Table of Contents shall then list the title and page number of all Figures, Tables, and Appendices in that order.

continued on next page...

Sample-G1, Continued

Generic Government CMP

5.1.4. <u>Section 1. Introduction</u>. This section shall include:

a. The purpose, scope and specific applicability of the configuration management plan and the project phase(s) to which it applies;
b. A brief description of the system or top level CI, and of the component lower level CIs, using approved CI nomenclature when available, to which the CM Plan pertains;
c. Reference to applicable directives or glossaries containing definitions of terminology and acronyms used in the plan; and
d. A description of the plan's major features and objectives and a concise summary of the project's approach to CM, including any special conditions (such as security constraints, interoperability constraints, non-developmental items, etc.) upon which the approach is based.

5.1.5. <u>Section 2. Reference Documents</u>. This section shall list the specifications, standards, manuals and other documents, including project policy directives, referenced in the Plan by title, document number, issuing authority, revision, and when applicable, change notice, amendment number, and date of issue.

5.1.6. <u>Section 3. Organization.</u>. This section shall describe and graphically portray the project's organization with emphasis on the CM activities, and which shall include:

a. The relationships and integration of the project organization and functional organization;
b. Responsibility and authority for CM of all participating groups and organizations including their role in configuration control boards, and the integration of CM functions with other program activities such as technical reviews;
c. Identification of the project's CM organization and it's responsibilities; and
d. Interfaces between the project's CM organization and the contractor's CM organization.

5.1.7. <u>Section 4. Configuration Management Phasing And Milestones</u>. This section shall describe and graphically portray the sequence of events and milestones for implementation of CM in phase with major project milestones and events, including as a minimum:

a. Release and submittal of configuration documentation in relation to program events (e.g., technical reviews);

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b. Establishment of baselines;
c. Implementation of internal and Government configuration control;
d. Establishment of configuration control boards;
e. Implementation of a status accounting information system and provision of reports or access to the status accounting information; and
f. Conduct of configuration audits.

5.1.8. Section 5. Data Management. This section shall describe the methods for meeting the configuration management technical data (data transfer, media, accessibility, security, etc.)requirements under the computer-aided acquisition and logistic support (CALS) requirements of Paragraphs 4.3 and 6.3, MIL-STD-973.

5.1.9. Section 6. Configuration Identification. This section shall describe the procedures for meeting the configuration identification (CIs, baselines, documentation, etc.) requirements of MIL-STD-973, Paragraphs 5.3.1 through 5.3.6.

5.1.10. Section 7. Interface Management. This section shall describe the procedures for meeting the interface management (CIs, system, Interface Control Working Group, etc.) requirements of MIL-STD-973, Paragraph 5.3.7.

5.1.11. Section 8. Configuration Control. This section shall describe the procedures for meeting the configuration control (CIs, changes, deviations, waivers, baselines, Configuration Control Boards, etc.) requirements of MIL-STD-973, Paragraph 5.4.

5.1.12. Section 9. Configuration Status Accounting. This section shall describe the procedures for meeting the configuration status accounting (CIs, baselines, records, data bases, etc.) requirements of MIL-STD-973, Paragraph 5.5.

5.1.13. Section 10. Configuration Audits. This section shall describe the procedures for meeting the configuration audit (functional, physical, etc.) requirements of MIL-STD-973, Paragraph 5.6.

5.1.14. Section 11. Contractor Control. This section shall describe the methods used by the Government to ensure the contractor's compliance with configuration management (identification, change control, status accounting, audit, etc.) requirements of MIL-STD-973, Section 4.

Appendix H

Cancellation Procedures

Cancellation Procedures

	Procedures
	1. The following actions will be taken before canceling, decommissioning, removing, or relocating the software (ADS) or hardware (ADPE) of a SCS.
	2. The ADS Manager and/or Equipment Custodian will prepare a CSRD, AF Form 3215, to be presented at Program/Special Management Reviews (PMR/SMR) on any ADS or relocation. (The AF Form 3215 is required even if the action is directed by the functional OPR, AFCC, or HQ USAF). The CSRD will contain the rationale/justification for cancellation, decommissioning, removal, or relocation in sufficient detail for the review/approval authority to make the final decision.
	3. The PMR/SMR panel will include the appropriate Standard System Manager, HQ SSC Configuration Manager, and ADS Manager as required for the specific system. When ADPE is involved, the resource advisor will also be a panel member to address equipment discontinuance or reuse and associated dollar reductions. The review panel will review and prioritize related requirements for reuse of the excess equipment, if needed. The AF Form 3215 will provide an audit trail for the ADS and maintain the integrity of the ADPE inventory.
	4. The AF 3215, must designate a project/program manager and provide the authority to begin appropriate actions to accomplish the project/program.
	5. The project/program manager will update the AF 3215 (if necessary) to ensure the following is addressed: a. The office responsible for downloading the system, normally SSC/SS. b. Manuals to be deleted. c. Program and files to be downloaded. d. Manpower impact, if any. e. Where the ADS will be relocated or reused. Identify the potential user of the system and their justification for reuse. f. Related work required of civil engineering, and the agency responsible for submitting the work request. Provide time frame for completion. g. Time frame to notify the contracting office if contractor equipment is involved. h. Milestone schedule for software downloading, equipment removal, etc., at each site involved. i. Agency tasked to provide removal instructions and remove equipment. j. Serviceability statement and agency responsible for serviceability testing. k. Communications line termination, if any. l. Specific device or equipment components involved. List by NSN, part number, and serial number if available.

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Cancellation Procedures, Continued

	Procedures
	6. The program/project manager will also complete the following actions as required by the specific ADS or ADPE involved: a. Prepare a notice of recision in accordance with AFR 5-1, Air Force Publication Management Program. b. Prepare and forward an AFCC Form 2212, Project Summary Sheet, to HQ SSC/SSMS cancel the Data Systems Designator (DSD) and system code. c. Send HQ SSC/SS an AF Form 636 for S1100 systems or an AF Form 2168 for H6000 systems requiring the download. In Block 14, address the rationale for the download and list the manuals to be deleted. In Block 17, list every program and file to be downloaded. d. Delete budget requests. e. Prepare an AF Form 9, Request for Purchase, if ADPE contractor assistance is required. f. To report excess ADPE, prepare and forward an SF 120 to 1st Information Group/GLIA, Washington DC 20330-6340 per DoD-STD 7950.1. g. If ADPE is removed, prepared an AF Form 1261 in accordance with AFR 700-4, Volume I, Chapter 4. File and maintain this form in accordance with AFM 12-50, Disposition of Air Force Documentation. h. If ADPE is relocated and a new custodian or alternate is required at the new equipment location, ensure an AF Form 1261 is prepared to indicate completion of relocation and transfer of FCA responsibility.

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Appendix I

Software Process Assurance (SPA) Plan

Software Process Assurance (SPA) Plan

Purpose

The purpose of this document is to describe the Standard Systems Center (SSC) Software Process Assurance (SPA) Plan. The framework against which the SPA plan is being measured and enforced is the Software Engineering Institute (SEI) Capability Maturity Model (CMM), and "Managing the Software Process", by Watts S. Humphrey, Addison-Wesley Publishing Company, Inc., 1990. The SPA plan consist of three primary components: 1) SPA reviews and audits, 2) SPA documentation, and 3) SPA metrics. This plan is valid for all software development efforts and will not be waived. Submit recommended changes to this plan to SSC/QIA.

a. SPA Plan Reviews and Audits - To ensure the adequacy of the requirement, the Software Process Assurance (SPA) group (SSC/QIA) will have the ultimate responsibility to ensure Center-wide adherence to the approved software development process. This authority for enforcement is the "Software Engineering Process (SEP)". It provides a foundation for all policy, responsibilities, procedures and standards, independent of technology, organizational structure, and specific methods. The SPA plan ensures the following fundamental processes are implemented in concert with the SEP:
   1. All software requirements will be defined and tracked.
   2. All software development will be planned.
   3. All software products will be controlled under configuration management.
   4. All software requirements, plans, and products will be independently verified.
   5. All software developed and released by SSC will follow SSC testing and release procedures.

The SPA group will ensure that program/project managers and appropriate staff, involved in the software development process, are provided orientation on the role, responsibilities, and authority of the SPA group function in fulfilling the terms of the software program/project commitments. Results of the review and audits will be briefed to the program/project managers, and appropriate SSC senior management, when necessary.

b. SPA Plan Documentation. Documentation of all noncompliance items will be maintained under configuration management. Discrepancies/defects identified will be negotiated with the software manager for corrective actions. If necessary, a Program/Special Management Review (PMR/SMR) will be held for SSC senior management to resolve the discrepancy/defect.

c. SPA Plan Metrics. Measurements are made and used to determine the cost and schedule status of the SPA group activities. Examples of measurements include: completion of milestones for the SPA group activities compared to the plan; work completed, effort expended and funds expended in the SPA group activities compared to the plan; and numbers of product audits and activity reviews compared to the plan.

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Responsibilities

The responsibilities listed below identify individuals and organizations that will be affected by the SPA plan:

a. SSC/ED or his/her designee will:
   1. Designate Automated Data Systems (ADS) managers in writing, who will be responsible to negotiate commitments, develop plans, and all other required activities.
   2. Review the following activities on a regularly scheduled basis:
      a. Requirements
      b. Program/Project status
      c. Software Process Assurance activities
   3. Receive briefings (as required) on the software process assurance activities.
   4. Ensure all software development are in compliance with the Software Engineering Process (SEP).

b. Directors or his/her designees will:
   1. Ensure all requirements for new systems or modifications to existing systems are reported to SSC/RMB, as directed in the SEP.
   2. Ensure compliance with the overall direction of the SEP.
   3. Attend SPA activity briefing to the Executive Director.

c. ADS/Project Managers will:
   1. Develop the required software development plans as specified by the SEP.
   2. Identify all requirements for new systems or modifications to existing systems to SSC/RMB as specified by the SEP.
   3. Involve the SPA group in the development of plans, commitment and any changes to commitments that directly affect software development efforts.

d. SPA group (SSC/QIA), in addition to other responsibilities, will:
   1. Ensure that activities documented in the SPA Charter are followed.
   2. Participate in the preparation, review, and approval of the program/project plans (e.g., administrative, technical, non technical).
   3. Provide briefings to SSC senior management on the status of requirements (number received, number active, and number completed).
   4. Monitor and recommend improvements to the SSC software development process, using the SEP as authority.
   5. Review and audit software development activities to ensure software process compliance. Results of the reviews and audits will be briefed to the ADS/Project Managers, their SPA representatives, and appropriate SSC senior management, when necessary.
   6. Identify and document software development activity deviations and defects in accordance with the SEP. Documentation of all noncompliance items will be maintained under configuration management.

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Responsibilities (Cont'd)

7. Stop software efforts from proceeding to follow-on activities when major process discrepancies/defects are discovered which could produce inferior quality products. Discrepancies/defects identified will be negotiated with the software manager for corrective actions. If necessary, a Program/Special Management Review (PMR/SMR) will be held for SSC senior management to resolve the discrepancy/defect.
8. Brief senior management on the SPA group activities.

Policy

This policy is valid regardless of organizational, management, or procedural changes. All aspects of the SSC software development efforts will comply to the following:

a. Requirements Management. All requirements, received by the SSC, will be stated in clear, verifiable, and testable terminology and subjected to documented procedures for review and approval prior to SSC resource expenditure. All requirements, and changes to requirements, will be reviewed, documented, and approved prior to implementation and will be maintained under configuration management as defined in the SEP document.
b. Project Planning. All software development efforts will have a manager assigned who is responsible for negotiating commitments and developing plans. All plans will be reviewed and approved by a level of senior management and maintained under configuration management as defined in the SEP.
c. Configuration Management. All software development efforts will have a configuration manager designated. All produced and approved software and documentation will be maintained under configuration management, in controlled repositories, for the entire life cycle. Baselines will be audited. All impacted activities will be aware of and knowledgeable of current requirement's baselines and configuration management.
d. Tracking and Oversight. All software development efforts will have an individual identified who is responsible for project performance. Corrective actions will be taken when the software plans are not being achieved, either by adjusting performance or by adjusting the software development plans. All changes and deviations will be subjected to review and approval prior to implementation of the changes.

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Software Process Assurance (SPA) Plan, Continued

Summary
The Software Process Assurance (SPA) involves reviewing and auditing software products and activities to ensure they comply with applicable process, standards, and procedures as defined in the Software Engineering Process (SEP). The primary objectives of the SPA group are to improve the quality of the software development management process and to reduce the cost and time needed to produce quality software products. An SPA group provides the staff and managers with the results of their reviews and audits. The SPA group performing the above functions must be independent of software development and project management. In addition, the SPA group works with the appropriate managers to resolve the noncompliance issues that may arise. SPA is required on all software projects.

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Appendix J

Functional Process Improvement Strategies

Functional Process Improvement Strategies

Introduction

This section provides an overview of the functional process improvement requirement extracted from the DoD 8020.1-M. Functional Process Improvement is an initiative under the OSD Principal Staff Assistants to eliminate the non-essential processes, and to simplify and streamline essential processes. Functional process improvement must be considered prior to the Program Start Review (PSR) as outlined in Chapter 4 of this document.

Functional Process Improvement

The following table outlines stages included in the overall scope of functional process improvement.

Description
Establish the Functional Architecture. The functional architecture documents the scope of the functional area and its functional activities; documents current and future methods, management processes, and data structures; established objectives, performance measure, and performance targets; and reflects decisions on the level of process standardization to be implemented.
Develop the Strategic Plan. The functional area strategic plan defines the major actions that will be accomplished to achieve the functional objectives.
Establish the Process and Data Baseline. Existing methods, management processes, and data structures in each functional activity are reviewed to establish the process and data baselines for process improvement.
Establish the Information System Baseline. Review the process and data baseline to identify the migration system that will serve as the information system baseline for process improvement.
Perform Activity Modeling. Activity modeling is used to identify opportunities to eliminate non-value added processes, to simplify and streamline those processes that do support the mission of the department. *Refer to page J-5 of this Appendix for further information.*
Perform Data Modeling. Data Modeling is used to document the information requirements of the functional activity, to identify reuse requirements and opportunities, to assist in identification of redundant processes, and to guide consistent data administration. *Refer to page J-5 of this Appendix for further information.*
Evaluate and Select Process, Data, and Automated Information system (AIA) Improvement Alternatives. Process improvement analysis leads to evaluation and selection of actions to enhance operation of functional activies. Evaluation decision packages and approval decision packages are integrated document sets providing functional, technical, and economic analyses of proposed process improvements. Each improvement decision contributes to implementation of strategic plans and functional objectives.

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Functional Process Improvement Strategies, Continued

Functional Process Improvement, (Cont'd)

Description
Prepare the Functional Economic Analysis (FEA). An FEA is the principal documentation in an integrated document set that makes up decision package. Preliminary FEA's are used by Functional Activity Program Managers to evaluate alternatives and select a preferred course of action. Final FEA's are used to secure OSD Principal Staff Assistant approval to proceed with execution.
Prepare the Data Management Plan (DMP). The migration system data management plan addresses all the data administration actions related to a specific migration system. It is a system-specific integration document that is maintained for the life of the information system it supports.
Prepare the Technical Management Plan (TMP). The migration system technical management plan addresses all the information system development and modernization actions related to a specific migration system. It is a system-specific integration document that is maintained for the life of the information system it supports. It identifies system-specific schedules, costs, benefits, and risks. It includes (or appends) necessary life cycle management (DoDD 7920.1), reference (g)) documentation.
Execute the Approved Process, Data, and System Changes. The Functional Activity Program Manager updates and executes the implementation plan that defines the tasks required to first prototype (if prototyping was not done prior to approval) and then broadly implement the approved process changes.
Develop Information Systems to Support Process Improvement. A disciplined life cycle management approach is used to manage DoD information and DoD information systems from inception through discontinuance. Information system development and operation is based on a model of information needs which encompasses the creation, collection, processing, transmission, use, storage, dissemination, and disposition of information. All information systems in DoD are subject to the Department's life cycle management policy and procedures. *Refer to DoD 8020.1-M, Chapter 15 for further information.*
Revise Baselines and Seek Further Improvement Opportunities. Each successfully implemented set of improvements defines a new process baseline, a new data baseline (if data requirements were changed), and a new information system baseline (if system support requirements were changed). Functional objectives are reviewed and revised as appropriate. The Technical Integration Repository is updated to reflect the new information system baseline. The updated baselines and objectives become the starting point for further process improvement.

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Functional Process Improvement Strategies, Continued

Functional Process Improvement, (Cont'd)

Description
Conduct Defense Information Management (IM) Program Reviews. Although OSD Principal Staff Assistants exercise full responsibility, authority, and accountability for management of their functional areas, oversight processes exist to ensure effective and efficient accomplishment of the DoD mission by all officials of the Department. For the Defense information management program, the DoD Senior IM Official is responsible for development, implementation, and oversight of standard DoD-wide IM policies, procedures, methods, models and tools, as well as appropriate IM performance measures and assessments.

Note
As previously mentioned, Activity and Data Models are the two stages of Functional Process Improvement that will be discussed further in this document. Refer to DoD 8020.1-M for additional information on these and all stages identified in this Appendix.

Functional Process Improvement Strategies, Continued

Modeling

The following table describes the role of modeling.

Description
A model is a tool to assist functional managers in understanding their current environment, and in improving that environment in an orderly manner. Through modeling, a rigorous and structured methodology is applied to define and document the baseline ("as is") and target ("to be") processes and information requirements of a functional activity. The Functional Activity Program Manager establishes an interdisciplinary joint functional/technical team, which applies a DoD standard methodology called IDEF (Integrated DEFinition language, pronounced I-Def) to develop activity models and data models, using procedures developed by the Director of Defense Information, and software tools available from a variety of sources including the I-CASE tool set.
Note: "As Is" and "To Be" Models must be completed prior to the Needs Analysis process (see diagram on next page).

Activity Modeling

The following table outlines a description of Activity Modeling.

Description
Activity models (or process models) of the processes that make up the functional activity show inputs, outputs, controls, and mechanisms through which the functional activity is (or will be) conducted. IDEF0 (IDEF Zero) is the DoD standard methodology used for activity modeling. Activity modeling procedures and methodology are discussed in further detailed in Chapter 8 and Appendix E of DoD 8020.1-M.

Data Modeling

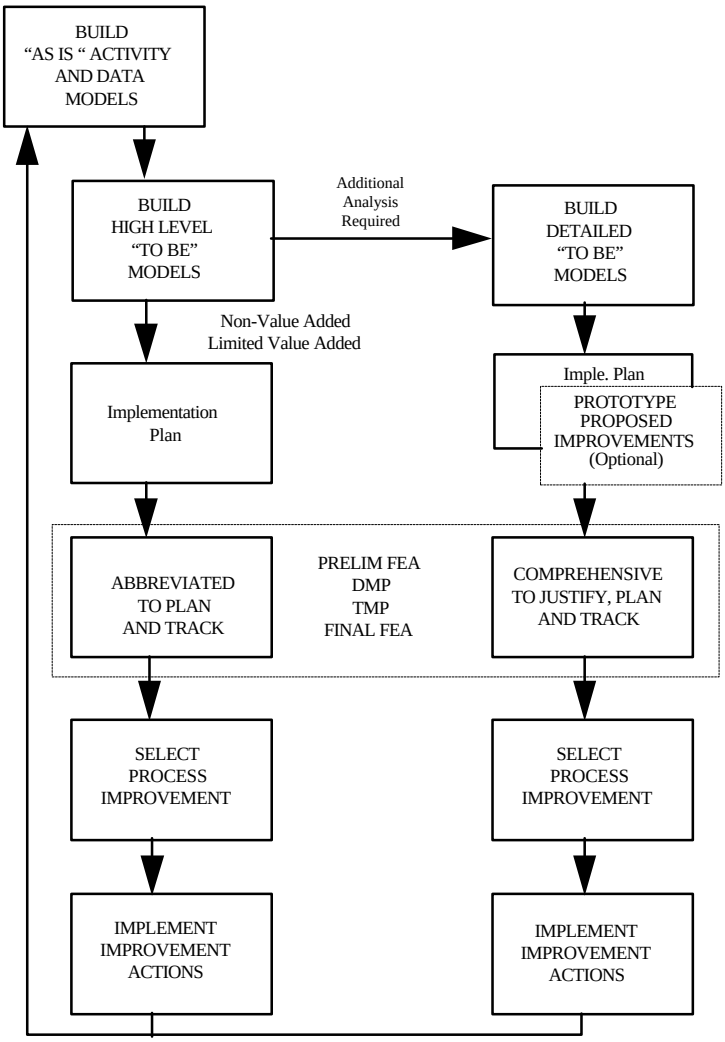
The following table outlines a description of Data Modeling.

Description
Data models define the entities, their attributes, their relationships, and the integrity constraints through which the information created and used by the functional activity are managed. Data models are important elements of functional process improvement, and are also a primary source of information for DoD-wide data standardization. IDEF1X (IDEF One X) is the DoD standard methodology used for data modeling. Other data modeling tools are also used to support the DoD data administration program. Data modeling is discussed in further detailed in Chapter 9 and Appendix F of DoD 8020.1-M.

Functional Process Improvement Strategies, Continued

Context

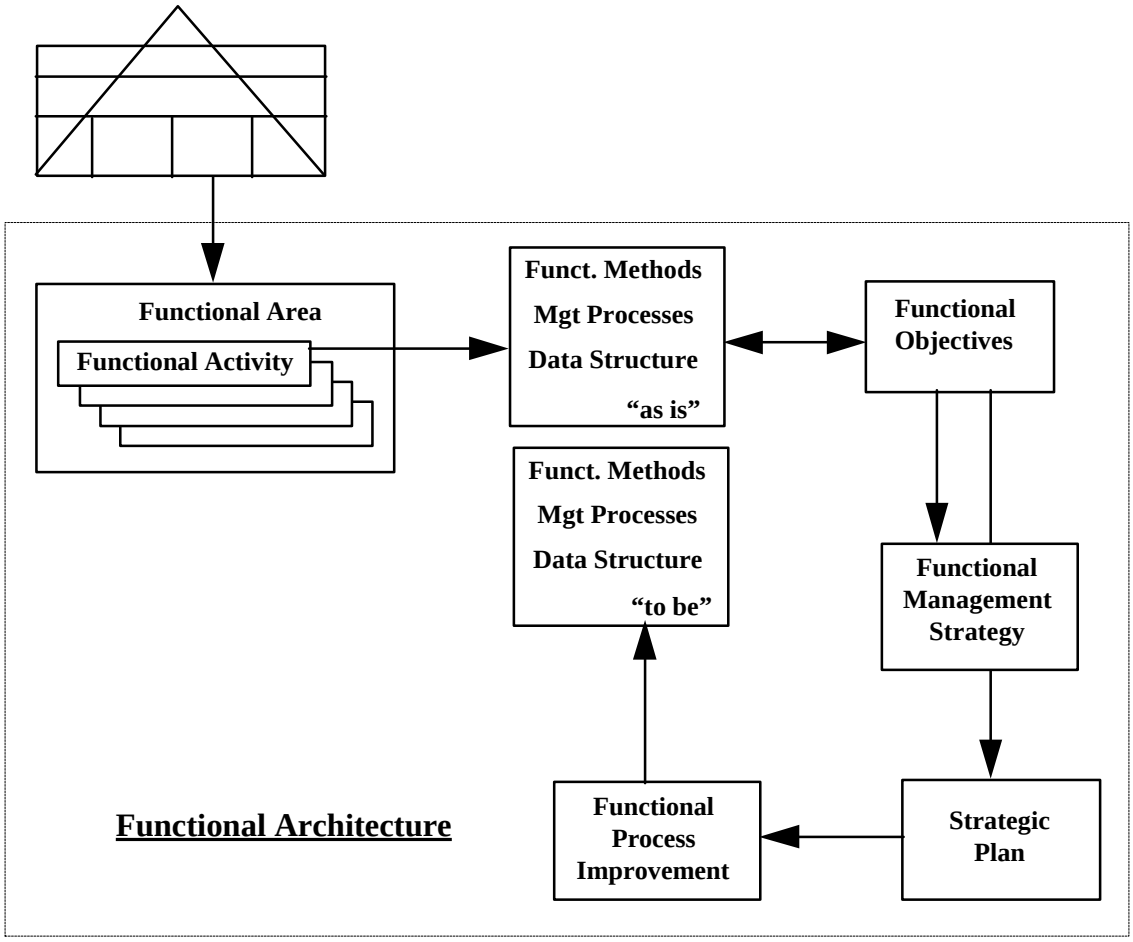
This diagram illustrates the more difficult phase of process improvement when all the non-value added and limited value added processes have been reviewed and eliminated or simplified. This phase uses comprehensive activity and data modeling to develop detailed proposals for process streamlining. Optional prototyping is used to determine functional and technical feasibility and formal evaluation is more rigorous.



Functional Process Improvement Strategies, Continued

Context

This diagram illustrates the parts of the Functional Architecture as they are developed and managed as a framework for functional process improvement.



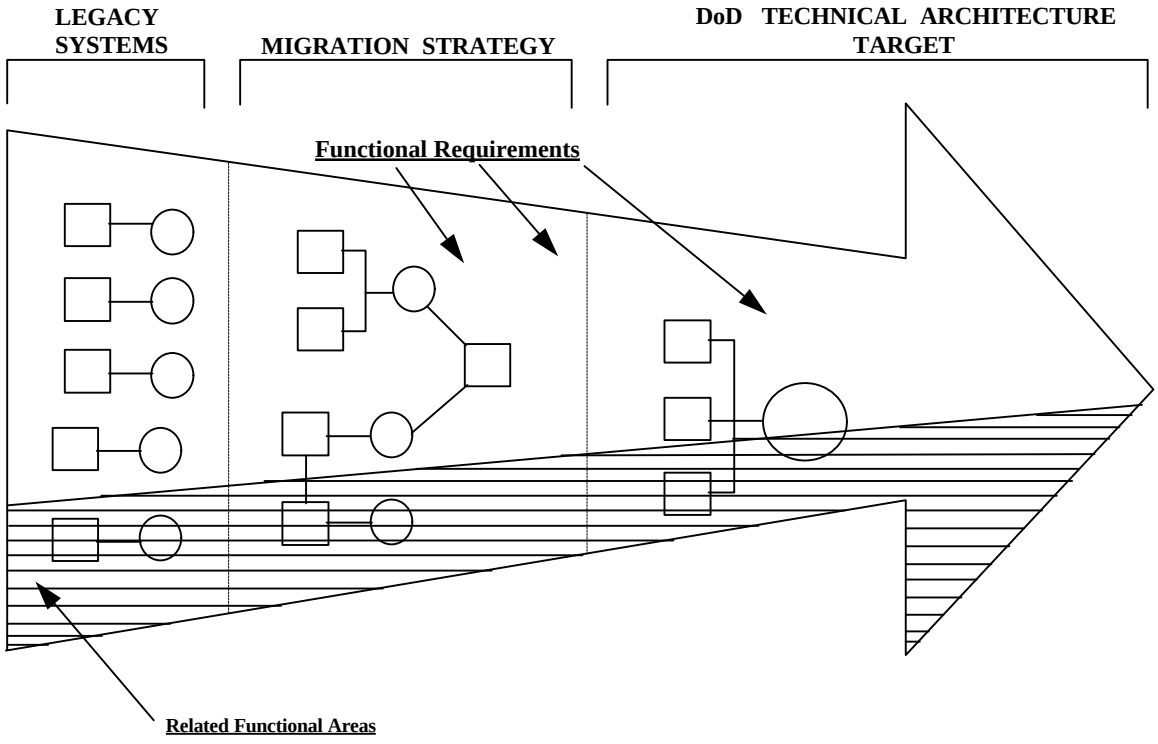
Functional Architecture

The following table outlines the description of a Functional Architecture.

Description
The functional architecture defines the functional objectives that the "to be" environment will support, and the functional management strategy to be followed in accomplishing process improvement. It also defines both the baseline "as is" environment and the target "to be" environment for the functional area. Initially, this is done at a very macro level (high level) of aggregation. As process improvement proceeds, the functional architecture evolves to greater degrees of detail and precision.

Functional Process Improvement Strategies, Continued

Context This diagram illustrates a Corporate IM System Implementation.



IM Systems The following table outlines the description of the IM Systems functional management process.

Description
"Corporate IM systems" are those information systems within a corporate IM functional area which have been formally designated by the OSD Principal Staff Assistant as either "migration systems" or "standard systems" based on application of the functional management process. Designation as a corporate IM system is a result of applying the functional management process, not a delimiter of the process to which the Defense IM program and the corporate IM initiative are applied.
The Defense IM functional management process requires early identification of a functionally adequate standard information system baseline from among existing legacy systems to support the approved process and data baselines.

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Functional Process Improvement Strategies, Continued

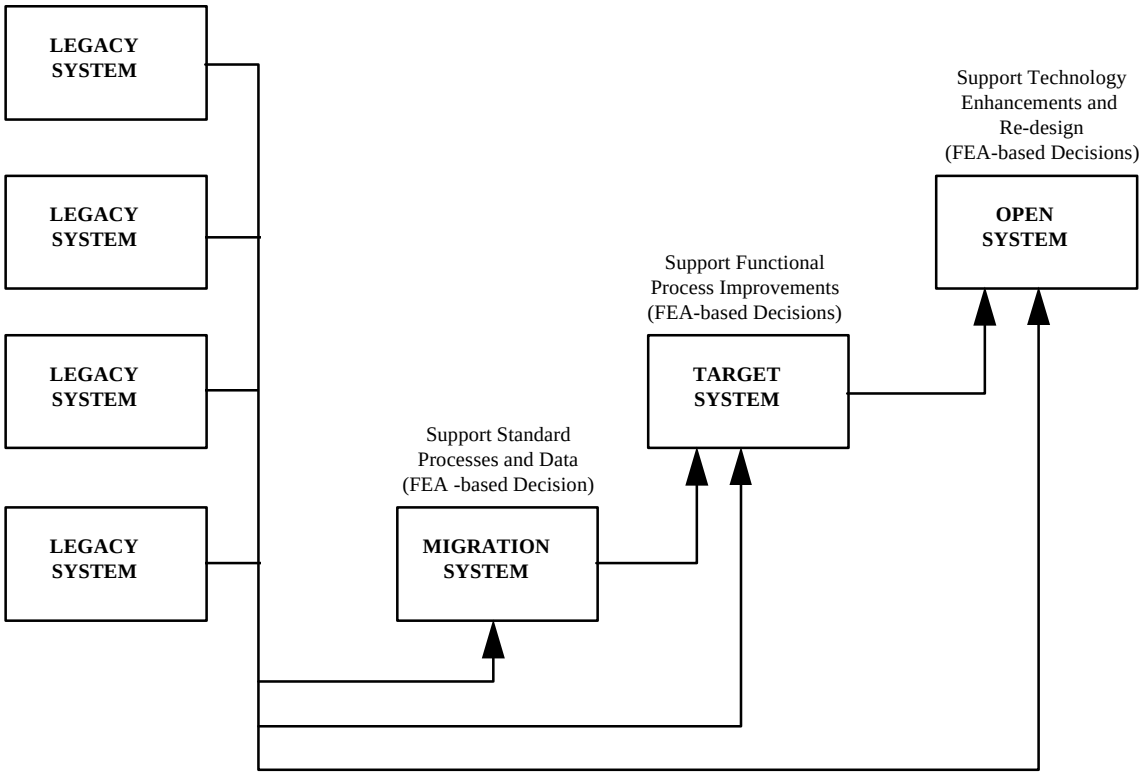
IM Systems, (Cont'd)

Description
Automation support requirements identified while establishing the process and data baselines provide the functional criteria that information systems must satisfy to be selected as the system baseline. The information system baseline may consist of one existing system, multiple systems, or parts of one or more systems. If no system is acceptable, then comprehensive process improvement analysis is undertaken to define requirements for an information system new start.
Costs and benefits of potential baseline systems are evaluated through functional economic analyses. Implementation planning defines the time-phased migration strategy through which the functional activity will rapidly transition operations from legacy systems to the information system baseline. Subsequent information system changes can then be implemented at lower cost and lower risk than would be the case if functionally equivalent, but technically unique, changes had to be implemented across multiple systems supporting the same process as illustrated in the diagram above.
Note: The migration option of moving directly from existing legacy systems to an open system environment is rarely feasible. Incremental and evolutionary change through functional process improvement and technology insertion, justified by functional economic analyses, offers the strongest probability for successful implementation as illustrated in the diagram on the following page.

Functional Process Improvement Strategies, Continued

Context

The following diagram illustrates an Information System Migration.



Migration System

The following table outlines a description of a Migration System.

Description
A "migration system" is an existing information system within a corporation IM functional area that has been selected and designated as the standard system to support standard processes for a functional activity. However, a migration system has not yet undergone transition to the standard technical environment and standard data definitions being established through the Defense IM program, and must "migrate" toward that standard environment. Migration systems can be designated at DoD-level (for DoD-wide application) or at DoD Component-level (for DoD Component-wide application). If the functional activity has DoD-level standard processes, then it should be supported by a DoD-level migration system. If the OSD Principal Staff Assistant's functional management strategy calls for DoD Component-level standard processes, then a DoD-level migration system may still be appropriate.

Standard System

The following table outlines a description of a Standard System.

Description
A "standard system" is a migration system within a corporate IM functional area that has completed the transition to DoD-wide standard technical environment (defined by the DoD technical architecture and the Technical Reference Model) and standard data definitions.

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Appendix K

Logistics/Computer Resource Planning

Logistics/Computer Resource Planning

Pre-development Phase
A. Computer Resources/Logistics Requirements Identification 1. Review available program direction documentation, e.g. the CSRD, ORD, and PMD. a. Identify the scope of the operational requirement, i.e. needed system has: both peacetime and wartime requirements; has multiservice use; has stand-alone/network requirements; has desired Reliability, Availability, and Maintainability (RAM) requirements; degraded, emergency, and backup requirements, training requirements, and etc. b. On the basis of the requirements study, identify computer resources needed to provide required capability. Per DODI 5000.2, Part 6, Engineering and Manufacturing, Sec. D., Paragraph 2.a. (1-2), computer resources include hardware, firmware, software, documentation, support services, supplies, and spare parts. They may be special purpose equipment or nondevelopmental items built to meet DoD-unique specifications and commercial off-the-shelf, general purpose, automated data processing equipment or services. Additionally, this includes the procedural and technical documentation produced by the Air Force or the contractor(s) to operate and support these resources. c. On the basis of the requirements study and projected computer resources required, identify user supportability needs. Identify the integrated logistics support (ILS) elements, e.g. maintenance needs, supply support needs (spares and consumables), manpower needs, training needs, and etc., that must be addressed within the scoped operational requirements.
B. Logistics Support Analysis (LSA). On the basis of the identified supportability needs, perform a tailored LSA as directed by DODI 5000.2, Part 6, Sec L.4.c. (4), AF Sup 1. The applicable LSA tasks tailored for NDI/COTS are recommended in DOD Nondevelopment Item (NDI) Acquisition Handbook, Standardization Document - 2 (SD-2), October, 1990, Appendix "D". (MIL-STD-1388-1A outlines LSA tasks for weapons system acquisitions. However, LSA for NDI/COTS is not as extensive as for weapons system acquisitions).

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1. For NDI/COTS acquisitions, Contractor Logistics Support (CLS) is the preferred support concept per DODI 5000.2, Part 6, Sec. D.3.h. (2) (c) and Sec. L, para 4c (1) - (2). Therefore, the primary LSA effort will address CLS. The recommended tasks are: Tasks 201, 203, 402, 403, and 501. Tasks 201 and 203 are applicable to this phase. Tasks 402 and 403 are applicable to the Development Phase. Task 501 is applicable to the Post-Development Phase.
   a. Task "201" - Market investigation/identification of commercial candidate items (Survey the potential contractor's/product's ability to meet ILS requirements within the operational scope). This survey will cover as a minimum:
      (1) General performance specifications of candidate items.
      (2) Available test data for candidate items.
      (3) Market place acceptability of candidate items.
      (4) Candidate items' manual(s) adequacy.
      (5) Potential vendor maintenance support capability.
      (6) Potential vendor supply support capability.
      (7) Potential vendor training availability/adequacy.
      (8) Potential vendor impact on other ILS elements as applicable.
      (9) Price range of candidate items including the support package outlined above.
      (10) Available list of references for potential vendors.

Note: Can be applicable to both hardware and software as directed by the program manager.

   b. Perform task 203, a suitability analysis, i.e. a comparative analysis, of existing government equipment/support capabilities vs the data gathered in LSA task 201.
2. In cases where CLS may not be the preferred support concept, consult DOD NDI , Acquisition Handbook, SD-2, October, 1990, chapter 8 and Appendix "D" for detailed ILS planning and LSA taskings.

C. Develop a proposed supportability strategy using LSA results and needs analysis.
1. Propose a hardware system. Support concept will be one of the following:
   a. CLS using existing SSC requirements contracts with tailored CDRL / CLIN mods;
   b. CLS using new RFP with tailored CDRLs/CLINs (Use SSC contracts as model).
   c. Other support concept IAW the DOD NDI Acquisition Handbook.
2. Propose a Software Support Concept selected from AFR 800-14, Attachment 8.

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D. Commence first iteration drafts of two interrelated documents: the Integrated Logistics Support Plan (ILSP) and the Computer Resources Life Cycle Management Plan (CRLCMP). The CRLCMP will be developed in conjunction with the ILSP per DODI 5000.2, Part 6, Sec. D, Para 3.a.(3). This will ensure hardware and firmware/software supportability are properly integrated and addressed during development. The plans will cross-reference each other. In this phase, these plans contain the identified system hardware and computer resources requirements.

1. The ILSP will follow the format outlined in DOD 5000.2 - M, AF Sup 1. It will discuss the applicable ILS elements within the CLS concept for the hardware and software interface from a hardware point of view. The ILS elements will be discussed using the analyzed LSA data extracted from this phase. (Don't forget that the LSA is iterative through the pre-development, development, and post-development phases). It will cross-reference the CRLCMP when/where the software interface discussion is applicable. Plan should contain the schedule milestones for each applicable ILS element.
2. The CRLCMP will follow the format outlined in AF Sup 1/5000.2-M. However, it must be tailored to fit NDI/COTS acquisitions. It will outline computer resource planning from a firmware/software point of view. It will cross-reference the ILSP when/where the hardware interface discussion is applicable. Plan should contain the schedule milestones for each applicable computer resource element.

E. Assist the program manager (PM) in forming and convening an Integrated Logistics Support Working Group (ILSWG). The active participants should include the program office, applicable matrix organizations, users, and other supporting organizations such as AFOTEC. The ILSWG is chartered to be a forum to affirm, validate, and coordinate externally at the working level, proposed ILS planning strategy and progress within the program. The ILSWG should meet as needed to discuss supportability planning progress and issues. Because of integration impact, there will be need for the ILSWG to meet jointly with the Computer Resource Working Group (CRWG) described below.

F. Participate as a primary member of the CRWG formed and convened by the PM, (co-chair in absence of PM, when meeting jointly with ILSWG). The active participants should include the program office, applicable matrix organizations , users , and other supporting organizations such as AETC and AFOTEC. The CRWG is chartered (see AFR 800-14, Attachment 10) as a forum to affirm , validate , and coordinate externally at the working level, proposed computer resource planning including firmware/software and life-cycle planning strategy and progress within the program. Because the CRWG planning and ILSWG planning will have integration impact on each other, there will be need for the CRWG and ILSWG to meet jointly to discuss and work out supportability issues.

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G. Review the proposed supportability strategy derived from the requirements analysis and the LSA and the proposed drafts of the ILSP with the ILSWG and CRLCMP with the CRWG.

H. Provide the CRWG and ILSWG coordinated supportability strategy recommendations to the PM.

I. Use the information in the CRLCMP and the ILSP to provide required input to related documents/plans, e.g. the Operational Requirements Document (ORD), and the Test and Evaluation Master Plan (TEMP). It is very important that all of these documents agree regarding the identified program requirements and acquired capabilities needing test and evaluation.

J. Coordinate the CRLCMP and the ILSP as follows:
   a. Applicable matrix agencies to the Director's level
   b. Within program office to System Program Director's level
   c. Standard System's Director's level
   d. External coordination to the applicable supporting and operating commands IAW AFR 800-14, chap 3, para 3.b(2).

K. Review the proposed hardware (ILSP) and computer resources (CRLCMP) supportability strategy in the Systems Requirements Review (SRR).

Development Phase
(Computer Resource and Supportability Planning)

A. Receive the approved acquisition (includes supportability) strategy from the PM.

Note: It may be necessary to delay the HW decision until the SW design is mature enough to minimize the risk of inadequate processor throughput and memory capacity.

B. Proceed with Computer resource planning based on this strategy (DODI 5000.2, Part 6, Sec D, Para 3.b. (1-4). This planning must be accurately reflected in the CRLCMP.
   1. Establish firmware/software supportability milestone schedules. Plan, coordinate, monitor and track milestone accomplishment using planning actions described below.
   2. Develop system acquisition strategies and schedules which integrate software development with the development of other system components;
   3. Address the requirements for software development tools, the software development environment, and the software integration environment;
      a. Address performance, schedule, cost, and post-deployment support;
      b. For all deliverable software, apply the guidance outlined in DoD-STD-2167 and DoD-STD-2168 as tailored to the application.
      c. Review planning progress with the CRWG.
      d. Review planning progress including CRWG commentary with the PM.
   4. Update the CRLCMP with the approved computer resource planning.

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C. Proceed with ILS planning IAW the approved supportability strategy. Use the data derived from the LSA tasks 201 and 203 analysis, the feedback from the working groups and the PM comments, as the planning basis.

1. Accomplish the following general ILS planning :
   a. Establish applicable ILS element milestone schedules. Plan, coordinate, monitor and track milestone accomplishment using planning actions described below.
   b. Based on the data results of the LSA tasks 201 and 203 analysis accomplish the following LSA tasks in this phase:
      (1) Task "402" - Determine impact of COTS on existing support (early fielding analysis).
      (2) Task "403" - Assess support sources after production ceases (post production support).
   c. Using the LSA, accomplish hardware maintenance and supply support planning. Outline the hardware maintenance and supply support scenario. Indicate the level at which specific repair or maintenance will occur. Indicate the level of user involvement, i.e. preventive maintenance, testing and reparable part identification, removal and replacement or preventive maintenance actions only. Indicate the support resources (support equipment and spares) needed for the maintenance scenario. Normally, the specific aspects of this maintenance and supply support planning is addressed under the CLS concept (see paragraphs 2 and 3. below).
2. CLS using existing SSC contracts . When the requirements contracts are used as sources for the system hardware acquisition, the results of the LSA should be used to assure that the provisions of the requirements contracts are adequate for support. If adjustments are necessary, refine/tailor the existing CLS to fit the user's needs. This refinement/tailoring will be accomplished by tailoring the applicable data item descriptions (DIDs) in the contract data requirements list (CDRL) or using modifications to CLINs in the existing contract.
3. CLS but New Request for Proposal (RFP) required. Prepare the logistics input for sections "C", "L", "H" (Warranty management), and "M" of the proposed RFP. Use the guidelines in the DOD NDI Acquisition Handbook, SD-2, October, 1990, chapter 5. Be sure to consider carefully the specific recommendations for developing each applicable section. The results of the LSA should be used to assure that the provisions of the new RFP adequately address the support requirements. Consider/Adapt the CDRLs used on the requirements contracts as models for CDRLs in the new RFP. Participate in the program office murder board for the proposed RFP. Change/Update logistics input accordingly.
4. In cases where CLS is not the approved support strategy, consult DOD NDI Acquisition Handbook, SD-2, October, 1990, chapter 8 and Appendix "D" for detailed ILS planning and LSA taskings.
5. Review/coordinate planning progress with the ILSWG.

continued on next page...

6. Review planning progress including ILSWG commentary with the PM. 7. Receive approved system hardware decision and planning from the PM. 8. Update the ILSP with the approved planning. 9. Participate in the source selection process as directed by the PM. D. After software design maturity and the system hardware decision is made, place special emphasis on training milestone schedule. There should be sufficient ILS and computer resource planning data to allow detailed training planning at this time. Use the updated ILSP and CRLCMP to define the needed training requirements. Coordinate with the contractor/the AETC as required. Jointly, prepare a system training plan (STP) IAW AFRs 50-8/50-11 that establishes procedures and responsibilities in conducting training for the acquisition program. Use the CRWG and ILSWG as forums to insure the users are informed and are satisfied with training planning, schedule and progress.
E. If the PM approves, review planned supportability and applicable documentation within the functional baseline at the System Design Review (SDR).
F. Continue computer resource/logistics planning and documentation updating as the acquisition progresses toward the product baseline. Ensure changes in computer resource planning are updated in the CRLCMP. If these changes have impact on the hardware interface, the ILSP must be updated, also.
G. Continue to coordinate changes/updates with the appropriate working group(s).
H. If the PM deems it necessary, review the updated computer resource/logistics planning and documentation at the Critical Design Review (CDR) .
I. Repeat the documentation coordination cycle described in Part I. Paragraph I. above as required for changes/updates. Insure copies of the approved CRLCMP and ILSP are distributed to all.
Post-Development Phase **(Supportability Testing and Evaluation and System Implementation)**
A. LSA task 501 is ready to be accomplished in this phase. Task "501" - Assess Supportability via Test and Evaluation. The product baseline, i.e. both the hardware and software configurations have been developed. The software and hardware interface should be undergoing testing and evaluation IAW the TEMP. Changes to SW/HW which would effect fielded systems must be assessed from supportability view, e.g. impact to delivered HW and spares.
B. Continue computer resource/logistics planning and documentation updating IAW configuration changes to product baseline, if any. Ensure changes in computer resource planning are updated in the CRLCMP. If these changes have impact on the hardware interface, the ILSP must be updated, also. Insure new pages reflecting the approved changes are sent to the field, as soon as possible.
C. Assist the program office in system implementation. Coordinate and work with the program office OPR to provide logistics responsibility input to the system implementation plan.

continued on next page...

Logistics/Computer Resource Planning, Continued

D. Ensure Users are trained and ready in sufficient lead-time for system implementation. Use the CRWG and ILSWG as forums to ensure the users are informed and are prepared to assist in meeting the system implementation schedule at the applicable bases.
E. Allow adequate lead-time from system implementation in the field to pay special attention to delivery of hardware/software releases to the field. Ensure that the contractor does not deliver HW systems too early, but rather the deliveries are coordinated between the program office and the user IAW scheduled implementation. Ensure that contractor deliveries are made to the correct locations IAW scheduled implementation. Ensure that early SW releases, if any, will work on incoming/fielded systems.
F. Assist the Standard Systems Data Manager in assuring that the contractor (s) comply with the required deliverables.

Appendix L

Software Program Life Cycle Strategies

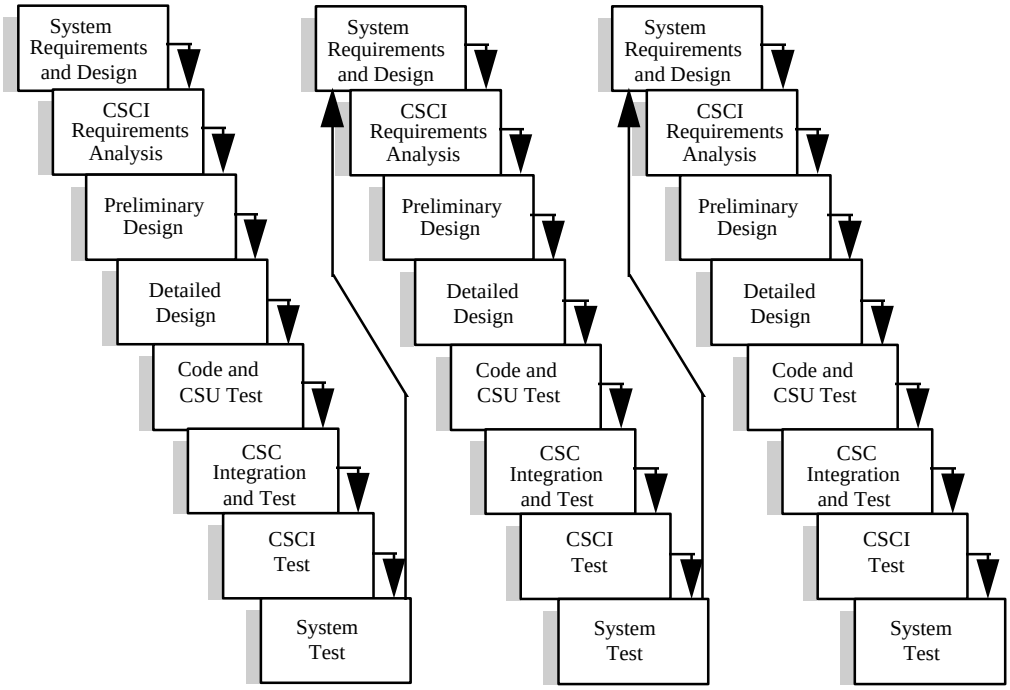
Software Program Life Cycle Strategies

Introduction

There are many program strategies for implementing the software life cycle. The *Evolutionary, Incremental, Spiral, and Ada Spiral Life Cycle Strategies* are outlined in the following pages. The *Grand Design (Waterfall)* and *Prototyping* methods will also be described in this section of the SEP. The program/project manager should select a software life cycle strategy based on the nature of your program and application, the methods and tools to be used, and the controls and deliverables that are required. The selected life cycle strategy will be approved at the Project Planning Management Review (*Refer to AF Pamphlet 63-115, Final Draft, Nov 1993*)

Context

This diagram illustrates **Evolutionary Development** at the CSCI level.



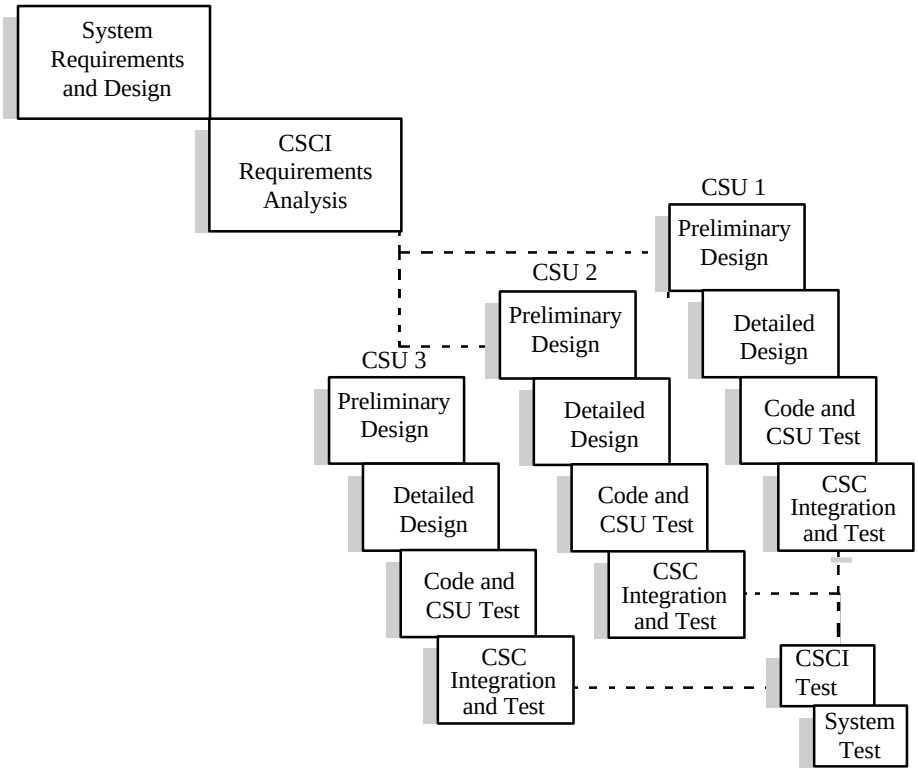
Evolutionary Development Strategy

The following table outlines the description of an Evolutionary Development strategy.

Description
This strategy involves developing an operational product early, then successively developing more refined editions of the product. It differs from prototyping in that a fully operational and documented initial product is generated. This initial core capability meets minimum essential requirements and is characterized by a flexible, modular structure. It also includes provision for the evolutionary addition of future function and changes as requirements are further defined. Evolutionary developments are conducted within the context of a plan for progress towards an ultimate capability. An evolutionary program strategy requires the development of increments of software that are demonstrated to the customer. As the program progresses toward completion, the customer can be involved through the entire development process.
Evolutionary program strategies are particularly suited to situations where, although the general scope of the program is known, a basic core of customer functional characteristics can *not* be defined and detailed system requirements are difficult to qualify or articulate. This is usually the case with software-dominated decision support systems that are highly interactive and have complex human-machine interfaces. This strategy is best employed for medium to high-risk programs (i.e. C3I, weapon, high cost/high resource consumption, high security, and extensive external interfaces systems). While this method does deliver an early operational capability, the first edition of the product takes more time and effort than in prototyping.
NOTE: The Evolutionary Development Strategy is **preferred** over the Incremental Development Strategy.

Context

This diagram illustrates an **Incremental Development** strategy at the software component level.



Incremental Development Strategy

The following table outlines the description of an Incremental Development strategy.

Description
This method involves developing software in groups of functional capabilities. Software is partitioned into increments, whose development is phased over the total development cycle. It allows the customer to investigate part of the product before the entire product is completed.

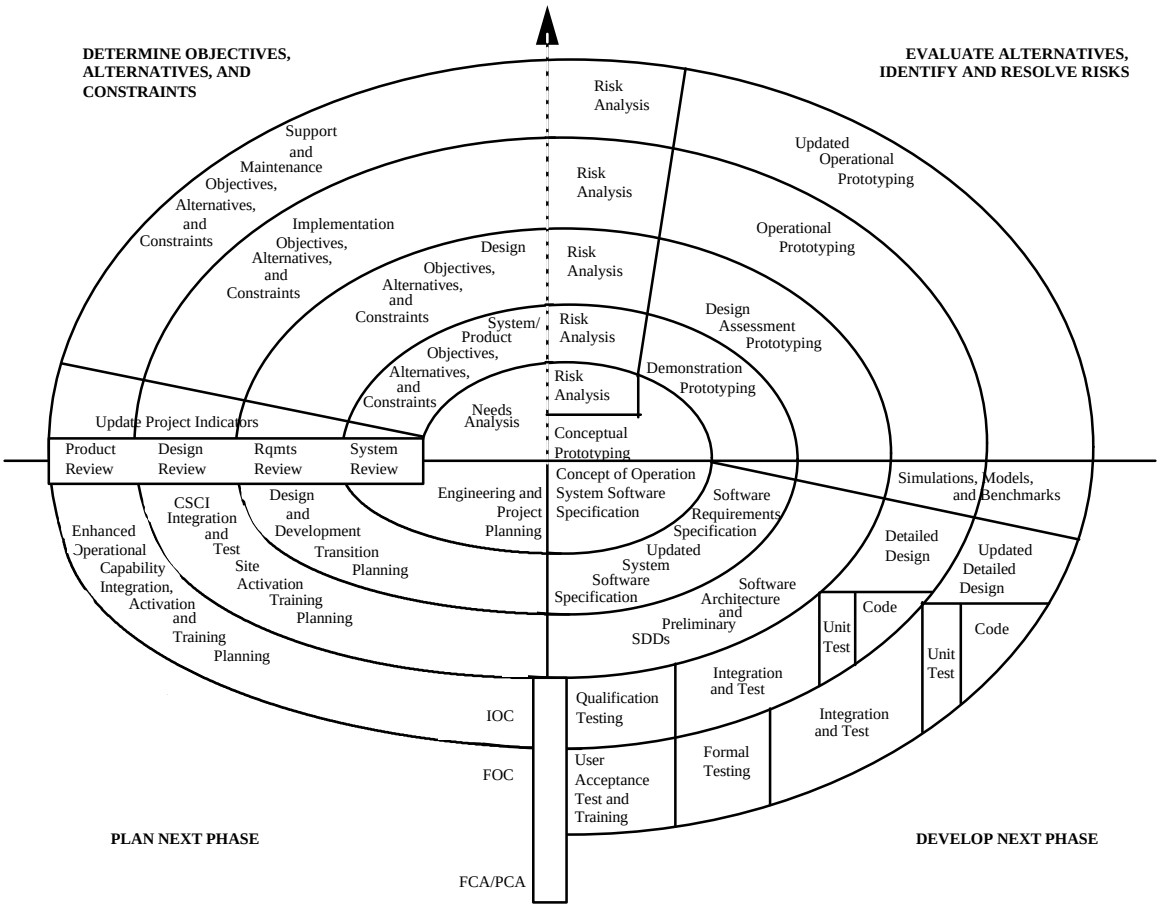
continued on next page...

Incremental Development Strategy, (Cont'd)

Description
Incremental program strategies are characterized by acquisition, development, and deployment of an initial core capability, worth fielding in its own right, that is subsequently upgraded or augmented to satisfy the total scope of the stated customer requirement. The number, size, and phasing of the increments leading to program completion must be defined by the program manager in consultation with the customer. An incremental program strategy is most appropriate for low to medium risk programs (systems that do not fall in the high risk category; see the Evolutionary Development Strategy for a list of high risk systems); or when customer requirements can be *fully* defined, but assessment of other considerations (e.g., risks, funding, schedule, size of program, early realization of benefits) may indicate a phased approach is more prudent.
While the incremental development diagram shows incremental development in conjunction with the grand design approach, it works equally well with other methods, such as prototypying or evolutionary development. It allows the customer to evaluate part of the completed product before the entire product is integrated and tested. It also promotes early discovery of problems and facilitates corrections.
NOTE: The Incremental Development Strategy should **rarely** be used at the SSC.

Context

This diagram illustrates an enhanced version of a **Spiral** (implemented by the spiral model) strategy.



Spiral Development Strategy

The following table outlines the description of Spiral Development strategies.

Description
Spiral development (implemented by the spiral model), developed by Barry Boehm, provides a risk-reduction approach to software development. In spiral development, the radial distance is a measure of effort expended, while the angular distance represents progress. It combines features of both the grand design and the prototype approaches to software development.

continued on next page...

Spiral Development Strategy, (Cont'd)

Description
Spiral development emphasizes evaluation of alternatives and risk assessment. These are addressed more thoroughly than with other strategies. A review at the end phase ensures commitment to the next phase or identifies the need to rework a phase if necessary. The advantages of spiral development are its emphasis on procedures, such as risk analysis, and its adaptability to different development approaches. If spiral development is employed with demonstrations and baselining/configuration management, you can empower continuous customer buy-in and established a disciplined process.
The following is a description of the **Ada Spiral Model Environment**: An adaptation of Boehm's spiral model, developed by TRW, is illustrated in the spiral model diagram (above). It is a development environment as it constitutes a model and a tool combination. It uses Ada as a life cycle language and offers the ability to have continual touch and feel of the software product (as opposed to paper). It is a demonstration-based process that employs a top-down incremental approach, resulting in early and continuous design and implementation validation. The advantage of this environment is that not only does it build from the top down, but because Ada supports partial implementation, the structure is automated, real, easily evolved, and each level of development can be demonstrated. Each build and subsequent demonstration validates the process and structure. Each level can serve as a formal baseline that can be controlled.

Context See Figure 5.4.2-2 for an illustration of the **Prototyping** strategy for the SEP.

Prototyping Strategy The following table outlines the description of a Prototyping strategy.

Description
Prototyping is another software development technique that allows the customer to look at alternatives. Often it is not possible for the customer to articulate requirements in depth. By showing the customer alternatives to solving a problem, valuable time and resources can be conserved. An example of an application for prototyping is the software that drives various displays either in a cockpit or on a desk top computer. Given the number of ways and the frequency of displaying graphical and textual information, the customer's involvement through observation of numerous alternatives is essential in satisfying the requirement.
One variation of prototyping is the development of a working prototype during requirements analysis, instead of writing a specification. This enables customers to evaluate whether requirements are being met and encourages customer involvement. Another prototyping method is to quickly proceed through the entire development process, have customers evaluate the product, then develop the operational product using the waterfall approach. Boehm refers to this practice as the "build it twice" approach.
Prototyping can result in substantial cost and schedule savings as it identifies requirements difficulties early in the program. However, it is not suitable for all applications. Care must be taken not to allow the customer to implement a prototype designed for demonstration purposes. Prototype software should rarely be implemented in the final system. It can, however, evolve into the final fielded version. A variant of this method is evolutionary prototyping, where successive refinements of a prototype are developed.

Advantages The following table outlines some advantages of prototyping.

Advantages
a. Provides a method and technique to design a system that satisfies previously undefined customer requirements through the use of a working model of the system. Clarifies and verifies specifications for the system. b. Expedites customer and developer interaction, affording an opportunity to create, demonstrate, and modify a proposed system before obligating costly resources.

Disadvantages The following table outlines some disadvantages of prototyping

Disadvantages
a. Prototypes may be produced too fast, resulting in too little analysis during the original requirements phase; alternative solutions may not be researched thoroughly. b. Quick-fix methods may override the opportunity to research and innovatively solve underlying problems. c. The failure to develop an overall, detailed system plan before prototyping individual modules can affect system integration, especially where large systems are comprised of smaller prototype individual pieces. d. A prototype may be decreed "operational" before completing the development cycle. This can create high maintenance costs, and error handling and interface problems. e. Documentation is usually lacking if a prototype system evolves into a production system.

Considerations The following table outlines some things to consider when prototyping.

Considerations
a. Effective management of resources can present a problem to managers. Prototyping has a tendency to shift away from the standard development processes and assigns new roles to analysts, programmers, and technicians in dealing with customer and systems development procedures. Instead of the traditional customer-to-analyst-to-programmer flow, bi-directional communications between the customer and application specialists are required. b. Successful prototyping is dependent upon a strong project leader who possesses knowledge of the system and has prototyping skills. A large investment of time from the most knowledgeable customers is required.

Grand Design (Waterfall) Strategy The following table outlines the description of a **Grand Design (Waterfall)** strategy.

Description
This is an older program strategy, often implemented by using the *waterfall model*, uses DoD-STD-2167A terminology. This strategy was conceived during the early 1970s as a remedy to the *code and fix* method of software development. Grand design placed emphasis on up-front requirements and design activities and on producing documentation during the early phases.

continued on next page...

Grand Design (Waterfall) Strategy, (Cont'd)

Description
Grand design provides a structured, disciplined method for software development. However, it did not support modern development practices, such as prototyping and automatic code generation. (*General Services Administration's, Alternatives to Grand Design for Systems Modernization, discusses when the waterfall is not appropriate and suggests alternative methods.)* With each activity as a prerequisite for succeeding activities, this strategy is a risky choice for unprecedented systems because it inhibits flexibility. With a single pass through the process, most integration problems surface too late. Also, a completed product is not available until the end of the process, which can discourage customer involvement.

Summation

Selecting an appropriate program strategy is not always an easy task. All program strategies presented here have unique advantages and limitations that must be considered in their selection. The SSC encourages consideration of using the prototyping strategy with the program life cycle you select based on the criteria listed in Rapid Prototyping Attachment 5.4.2-2 of this document.

Appendix M

Domain Analysis and Design/Project Summary Worksheets

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Project Summary Worksheet

Introduction On the pages that follow are photocopier-ready forms extracted from the DISA/JIEO/CIM Software Reuse Program Software Reuse Metrics Plan, version 4.1. Refer to the referenced document for further information.

PROJECT SUMMARY WORKSHEET

Program/Project Manager _____ Phone _____ Date _____

Organization _____ Email _____

Project Name _____

See DISA/JIEO/CIM Software Reuse Metrics Plan, version 4.0, for explanation of terms.

Part 1: Planned

New custom SLOC	_____	Reuse repository sources:
New reusable SLOC	_____	_____
Verbatim reuse SLOC	_____	_____
Adaptive reuse SLOC	_____	_____
Acquired for reuse fees ($)	_____	
Effort (staff-hours)	_____	
Number of problem reports	_____	
Start date	_____	
Completion date	_____	

Part 2: Actual

New custom SLOC	_____	Reuse repository sources:
New reusable SLOC	_____	_____
Verbatim reuse SLOC	_____	_____
Adaptive reuse SLOC	_____	_____
Acquired for reuse fees ($)	_____	
Effort (staff-hours)	_____	
Number of problem reports	_____	
Start date	_____	
Completion date	_____	

version 93/08/04

Domain Analysis and Design Worksheet

DOMAIN ANALYSIS AND DESIGN WORKSHEET

Domain Manager Name _____ Phone _____ Date _____
Organization _____ Email _____
Domain Name _____
Sub-domain Name _____

Part 1: Planned Date plans recorded _____
Methodology used for domain analysis and design _____
What is the last step in your planned domain engineering process? _____
Estimated start date _____ Estimated completion date _____
Estimated staff-hours (not counting training) _____
Estimated number of domain engineers (DEs) _____
Amount of previous domain experience held by DEs (staff-months) _____
Amount of previous domain analysis experience held by DEs (staff-months) _____
Systems to be analyzed: Number _____ Number fielded _____
Average size of systems in domain (SLOC) _____
Number of projects expected to use results of domain analysis _____
What products are planned to be produced? _____
_____
_____

Part 2: Actuals Date actuals recorded _____
Methodology used for domain analysis and design _____
What was the last step in your domain engineering process? _____
Actual start date _____ Actual completion date _____
Actual staff-hours (not counting training) _____
Actual number of domain engineers (DEs) _____
Actual number of domain experts interviewed _____
Actual number of hours spent interviewing domain experts _____
Amount of previous domain experience held by DEs (staff-months) _____
Amount of previous domain analysis experience held by DEs (staff-months) _____
Actual characteristics of each system analyzed:

Brief name	Had documentation?		Documentation up-to-date?		System fielded?		SLOC (DISA/JIEO/ CIM/XE Core definition)
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____

Number of projects expected to use the results of domain analysis _____
What products were produced?
_____
_____

Appendix N

SSC Software Engineering Process (SEP)
LAN Access Instructions

SSC SOFTWARE ENGINEERING PROCESS (SEP)
LAN Access Instructions

(*As Of: 20-Sep-96)*

1. There are two ways to access the SEP on the SSC LAN:

a. From DOS: (Before executing Windows).

(1) From the DOS prompt, type "**f:\public\attach B856-1fs1/SEP"** (Drive "f:" may be different for some systems).

(2) Next, type "**f:\public\map s: = B856-1fs1/SEP:**" (Note: "s:" can be any available drive).

(3) Now, execute Windows and enter Word for Windows to access the SEP from Drive s:, or the drive you selected. (See Paragraph 2 below ; ***NOTE: USE "NORMAL MODE." DO NOT USE "PAGE LAYOUT.")***

b. From Windows:

(1) From File Manager/Disk Menu, select "Network Connections."

(2) Do the following steps to connect to the B856-1fs1 file server:

(a) Click "Browse," "Attach," and then select "B856-1fs1" from the list.

(b) Type "SEP" for the USERNAME (no password) and then press OK.

NOTE: You *may* have to repeat (b) above when you reboot your system.

(c) From the Browse window, select "B856-1fs1/SEP" from the list and press OK.

(d) This will return you to the "Network Drive Connection" window.

(e) Select an unused drive from the list and click "Map." (Note: Do not mark the "Permanent" box since the LAN has a limit of 100 permanent attachments to the file server.) Now click "Close." You may now access the SEP the way you would access any other "Word for Windows" file, from the drive you mapped to.

2. The entire SEP is contained in file "@SEP.DOC." This is a special file that allows the use of the Word for Windows **(Version 2.0 only)** browsing engine. Other files are included for printing or use in other applications. ***NOTE: USE "NORMAL MODE." DO NOT USE "PAGE LAYOUT ." Page layout takes 4 times as long to load.*** Review the "Readme" file for further information.

3. The SSC SEP on the LAN will always contain the latest version. All changes will be posted to file "Changes.doc."

4. If you have any problems accessing the SEP on the LAN, call Dick Stowers, 6-3781, or Darrel Tubbs, 6-3782.

INSTRUCTIONS

1. These instructions describe how to access the **Software Engineering Process (SEP)** document. Notice the buttons on the toolbar at the top of this screen; T, P, 1, 2, 3, etc. Each button represents a bookmark in the SEP. If you click on a button, it will direct you to the area in the SEP as identified below:

T = TABLE OF CONTENTS
P = PREFACE
1 = CHAPTER 1, **2** = CHAPTER 2, etc.
A = APPENDIX A, **B** = APPENDIX B, etc.

2. Also, the document contains **embedded green text** which may be *Double-Clicked* to direct you to the indicated area. If you would like to search for a particular subject in the SEP, simply use the Word for Windows text search function. Press "**Shift F5**" to return to a previous area.

3. If you have any questions, please contact Maj Darden, SSC/QIDM, 6-4021.

STANDARD SYSTEMS CENTER HANDBOOK 700-10

SOFTWARE ENGINEERING PROCESS (SEP)

VERSION 2.0
16 March 1994
(Supersedes Version 1.6)

SEP Feedback Form

To: SSC/QID Comment No. (QI Use Only)_____

Commentor Name: _____

Organization/Office Symbol: _____ Telephone No. _____

Comment Type: _____ TYPO/EDITORIAL _____ SUGGESTED _____ ESSENTIAL

Chapter No./Attachment No./Appendix No.: _____ Page No. _____

Proposed Change: (If additional space is needed, you may use the back of this form)

Rationale/Justification/Comment (ESSENTIAL ratings require justification):

Disposition:
_____ Accepted
_____ Not Accepted
Rationale:

POC:
The Software Engineering Process (SEP) Team
SSC/QIDM
Commercial: (205) 416-5882/4021 FAX: (205) 416-2077
DSN: 596-5882/4021 596-2077

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Preface

Introduction

This document presents the Standard Systems Center (SSC) Software Engineering Process (SEP). The SEP implements the DoD 5000 series and brings together all government documents as specified in Chapter 7 to form a total framework for all software development efforts.

Applicability

All software development and maintenance efforts regardless of size, nature, or origin (government or contractor developed) must follow this document.

Tailorability

The SEP may be tailored due to differences in requirements, resources, schedules, size, etc. This tailorability allows the project/program managers to select steps from this approved process to accomplish their task. After the tailored process has been approved, no deviation will be allowed, unless approved by the Executive Director.

Background

The SSC SEP is a product of the SSC's on-going Software Process Improvement (SPI) efforts. The SEP was created to address the need for a defined, measured, repeatable way of managing and developing software products. It is not intended as a solution, but rather a baseline from which to continuously refine and improve the process.

Audience

The SSC SEP has four primary audiences:

Audience	Use
SSC Leadership and Program/Project Managers	Reviews, approves, and implements the SSC SEP.
Team Leaders, Functional Analysts, Programmers, Functional Users, and Support Personnel	Carries out SEP tasks and procedures.
Software Process Assurance Group	Ensures compliance with the SSC SEP.
Software Engineering Process Group	Captures the current state of the SSC SEP and evaluates/updates recommended changes and improvements.

Access

The SEP is available in hardcopy and on the SSC LAN (see Appendix N for LAN access instructions). The LAN version also has numerous subdirectories that contain documents referenced in the SEP and other associated documents, i.e., the Capability Maturity Model (CMM), sample SDPs, and other SSC "best" documents. Since connectivity of the SEP on the LAN varies, contact a SSC/QI representative at 416-5882 for any assistance that may be needed.

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1.0

Introduction

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Chapter 1

STANDARD SYSTEMS CENTER (SSC) SOFTWARE ENGINEERING PROCESS (SEP) Introduction

Introduction

A common approach to developing software products at the SSC has been defined and baselined in the form of this document, *The SSC Software Engineering Process (SEP).*

The SEP is approved by, and implemented at the direction of the SSC Executive Director.

Source

This document is built upon the foundation of existing efforts within government and industry. Considerable time was applied at reviewing and extracting applicable information in ensuring this document captures the "best of the best." The government manuals, regulations, standards, and instructions, listed in Chapter 7, served as the cornerstone in developing this document. The creation of this document is the result of a cooperative team of experts from across the SSC.

The IEEE Standard 1074, *Developing Software Life Cycle Processes*, along with the *Capability Maturity Model (CMM) for Software* and the *Key Practices of the Capability Maturity Model* which were developed by the Software Engineering Institute, Carnegie Mellon University, were also used in developing this document.

Office of Primary Responsibility (OPR)

You Own It

As in any good organization focused on Total Quality Leadership (TQL), the standards and procedures used to provide a product or service belong to people who use them.

You Improve It

It is expected that by collecting and analyzing the basic measurements associated with this process, improvements will be made. More importantly, those who use this process will undoubtedly identify and suggest ways to improve it.

The SSC Software Engineering Process Group (SEPG) is the OPR for this document. Submit the SEP Feedback Form, in front of this document, for all recommendations/changes to SSC/QID.

continued on next page...

SSC SEP Introduction

Standardization and Tailorability

Two opposing forces are at play in the software development environment; **Standardization** and **Tailorability**.

Standards are necessary for obvious reasons, (i.e. accountability, traceability, and manageability). However, the need to tailor is due to differences in requirements, resources, schedules, size, etc.

Finding a compromise between standardization and tailorability has always been a major problem.

"Some things will always be..."

Certain "truths" about software development have evolved over the years and will always apply, regardless of languages, platforms, tools, or lifecycles.

Requirements must be evaluated, documented, and approved. Resources must be allocated. Work must be planned and estimated. Work must be tracked and compared with plans and estimates. Software must be tested. Artifacts associated with the development should be placed under configuration management. And there are others.

"But my project is different..."

Another truth about software development is that all efforts are unique in certain ways.

Problems are of different levels of complexity or abstraction. Some are more critical than others. Different levels of resources are applied to each problem. Changes in tools and technologies create unique opportunities.

"One does not exclude the other..."

The problem with many previous attempts to write standards for software development was this: *they tried to prescribe what to do as well as imply or direct the order in which to do them.*

The key to standardization and tailorability is prescribing what activities need to be accomplished (and where applicable, the order) but allowing flexibility to the sequence.

The SEP Tailoring Worksheet, contained in Appendix D, page D-1, will allow program/projects the flexibility to select steps from the approved process to accomplish their task. After the tailored process has been approved, no deviation will be allowed, unless approved by the Executive Director.

continued on next page...

SSC SEP Introduction

Software Process Assurance

A new concept (for the SSC) introduced in this process, and critical to its success, is Software Process Assurance (SPA).

It differs from Software Quality Assurance (SQA) in that, SPA focuses on the processes used to create a product, while, SQA focuses more on the product itself.

Quality Truths

One of the universally accepted tenets of Total Quality is that: *the quality of a product or service is directly related to the quality of the process that produced it*. Just as one would inspect a product for deviation from standards, so must one inspect the process for deviation from its standards.

Continuous process improvement dictates that:

1) A baseline process must be defined
2) **That process *must* be followed**
3) The results of the process can then be measured
4) Improvements can then be designed and implemented based on that quantifiable measurement.

The SPA ensures the process is followed. The SPA is a planned and systematic means for assuring management that documented plans, directives, methods, procedures, and standards are being applied effectively during the software engineering process. The SPA provides management with appropriate visibility into the process being used by the software project. Measured outputs from a process are *meaningless* if there is no degree of confidence as to the state of the process.

Why Processes Fail

The numerous standards that have come and gone failed for three main reasons:

1) The standard is unusable (unreadable).
2) The standard is inflexible (untailorable).
3) **The standard is never enforced with certainty.**

Despite the noblest of intentions, pressures (both external and internal to the organization) tend to throw standards out the window. People do what is *inspected* not *expected.*

continued on next page....

SSC SEP Introduction

Approach

Standards and flexibility are also addressed in the approach taken to defining the SEP. At the SSC, the process for developing government or contractor-developed software products, (or maintaining and modifying existing products), is seen as having three distinct parts or *phases:*

- The *Pre-development Phase* encompasses the needs analysis and planning activities. It is a goal that this phase be executed in a uniform manner across the SSC.

- The *Development Phase* encompasses the functional analysis, allocation, design, code, and unit test activities. This phase allows for the most flexibility from project to project.

- The *Post-Development Phase* encompasses the qualification testing and release activities. Again, the goal for this phase is a high degree of standardization across the SSC.

About This Format

In order to correct one common flaw among all previous versions of a software development process (readability), the SSC SEP uses Information Mapping. This is a methodology that utilizes research principles about how people process information.

Information Mapping is a registered service mark of Information Mapping, Inc.

Remaining Chapters

The rest of this document is organized as follows:

Chapter	Title	Page
2	Components of the SSC Software Engineering Process	2-1
3	SSC Directives for Software Development	3-1
4	The Pre-Development Phase	4-1
5	The Development Phase	5-1
6	The Post-Development Phase	6-1
7	Acronyms, Definition of Terms, and References	7-1
8	Appendices	8-1

2.0

Components of the Software Engineering Process

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Chapter 2

Components of the Standard Systems Center (SSC) Software Engineering Process (SEP)

Overview

Introduction

The SEP consists of multiple components. In order to aid in the understanding and discussion of the SEP, a framework must be established.

In This Chapter

This chapter covers the following topics:

Topic	Section
Components of the Software Engineering Process (SEP)	2.1
Phases of the SEP	2.2
Processes	2.3
The Four Stages	2.4
Stage Attributes	2.5
Activities	2.6
Tasks and Procedures	2.7

SEP Layout

The overall layout of the SEP document is displayed in Atch 2.1-1, page 2-xxxv, for your convenience. This depicts the processes, activities, reviews, and baselines for the software engineering process.

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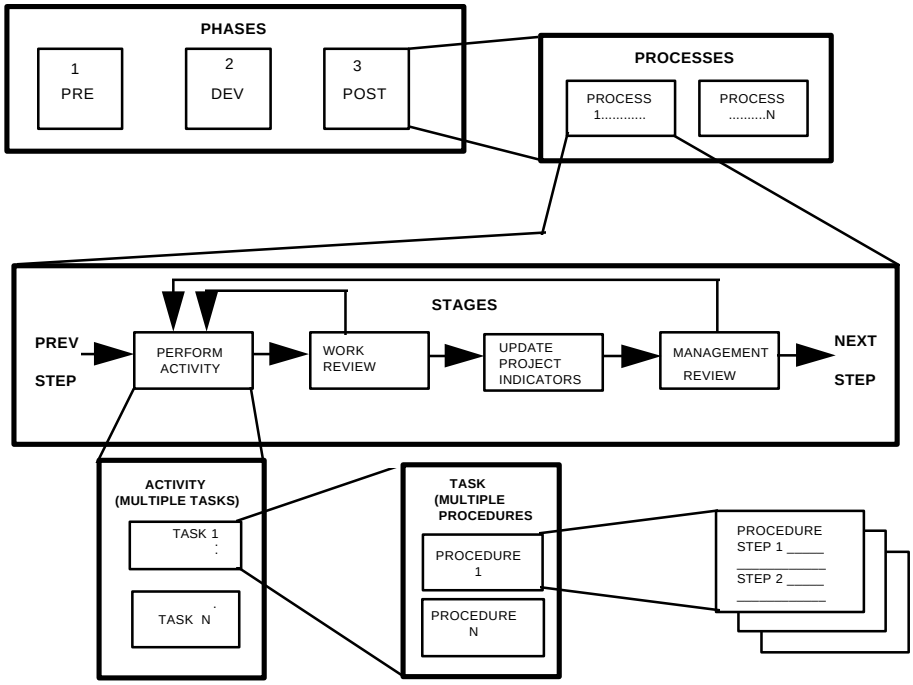
2.1 The Components of the Software Engineering Process (SEP)

Introduction

The SEP encompasses all work performed and all artifacts produced in creating a software product.

Context

This diagram illustrates the various components and their inter-relationships in the SEP.



SEP Components

The SEP components are:

Components...	Which consist of...
Phases	3 Phases (Pre-development, Development, and Post-Development)
Processes	10 Processes
Stages	4 Stages (Perform Activity, Work Review, Update Project Indicators, and Management Review)
Activities	One or more Tasks
Tasks	One or more Procedures
Procedures	Step by step instructions

Support Activities

In addition to the components, there are support activities that span the entire SEP:

- Project Tracking and Oversight
- Configuration Management
- Quality Assurance (*both process (SPA) and product assurance (SQA*))

2.2 Phases of the SEP

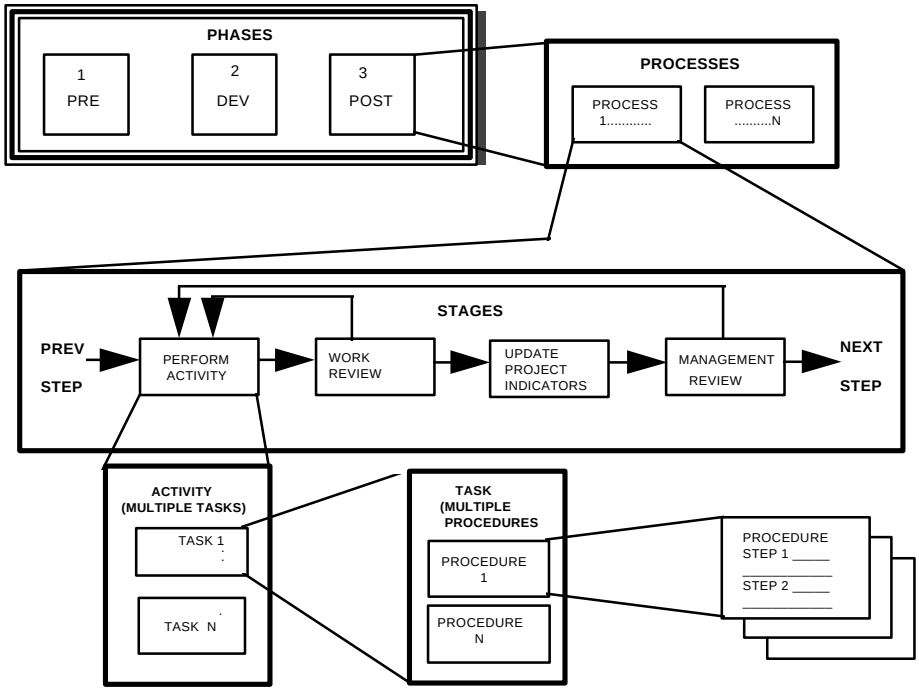
Introduction

Phases are the highest logical divisions of work in developing a software product. Each Phase has its own entry and exit criteria, as well as mechanisms and constraints for accomplishing the work.

Phases represent the highest level of process abstraction in the SEP.

Context

This diagram illustrates the relationship of phases to the overall SEP.



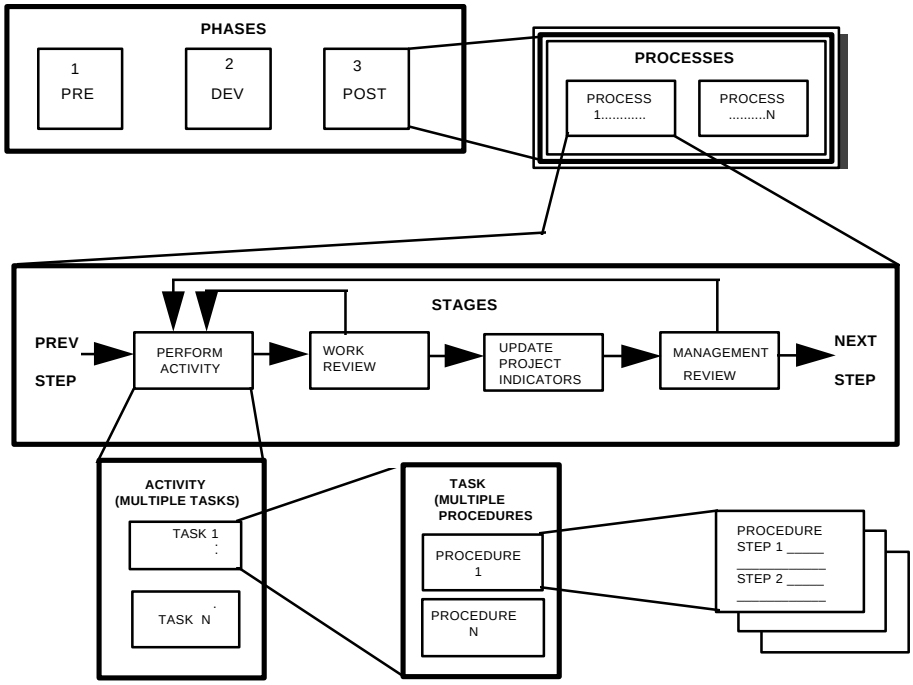
Three Phases The SEP consists of 3 Phases, each phase constitutes a chapter in this document.

Phases	Description
Pre-Development	All work accomplished and artifacts produced prior to the development of the software product. This includes needs analysis, documentation and approval, as well as, project planning. This phase is executed uniformly across the SSC.
Development	This phase encompasses the work performed and artifacts produced during the requirements analysis, design, coding, and testing of a software product. This phase allows the most flexibility from project to project based on development methodology.
Post-Development	This phase encompasses qualification testing and release activities. As with the Pre-Development phase, this phase is also executed uniformly across the SSC.

2.3 Processes

Introduction Processes are the next level of abstraction in the SEP. There are 10 Processes within the 3 phases of the SEP.

Context This diagram illustrates the relationship of Processes to Phases within the SEP.



Processes There are ten specific processes within the 3 phases of the SEP:

Processes	Performed during:
• Needs Analysis • Project Planning	Pre-Development
• System Requirements/Design • Software Requirements • Software Design • Code and Test	Development

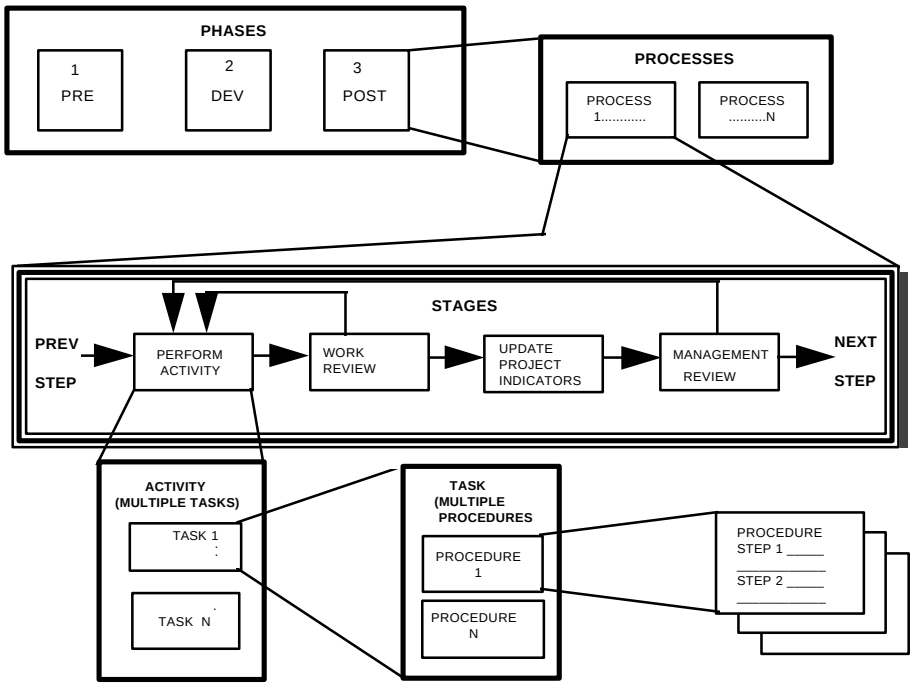
Processes (Cont'd)

Processes	Performed during:
• Qualification Test & Evaluation I (QT&EI) • Qualification Test & Evaluation II (QT&E II) • Qualification Operation Test & Evaluation (QOT&E) • Product Release	Post-Development

2.4 The Four Stages

Introduction Stages are logical groupings of work activities within a process.

Context This diagram illustrates the relationship of Stages to Processes within the SEP:



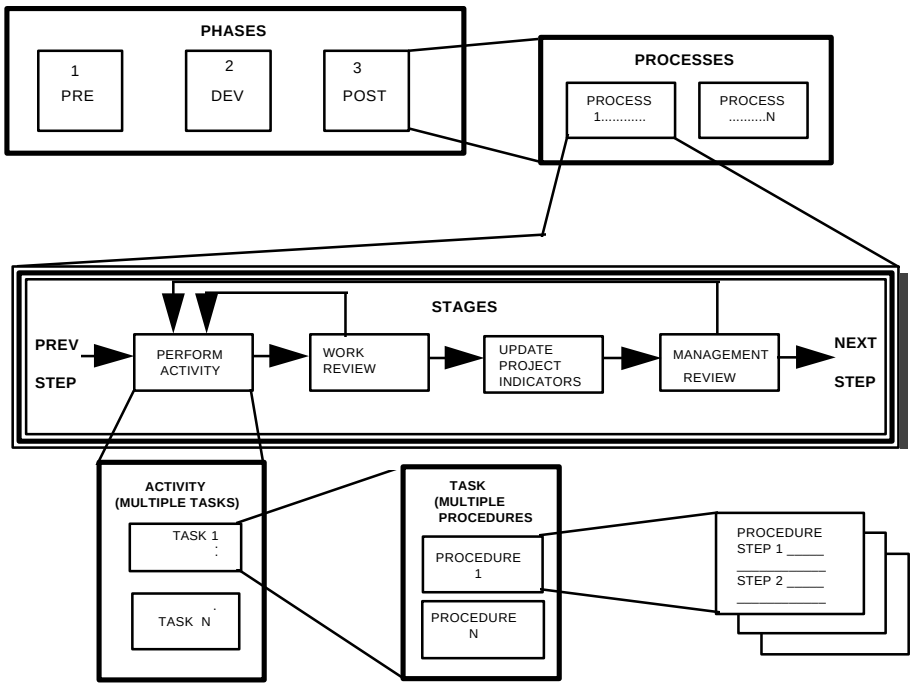
Four Stages Each process in the SEP consists of 4 stages:

Stage	Description
Perform Activity	Activities that produce a software artifact are performed during this stage.
Work Review	A Work Review is conducted after every Perform Activity stage to ensure technical completeness and conformance to SSC standards and policy. An independent body of experts review the artifacts and recommend continuation or rework.
Update Project Indicators	When the software artifacts have been technically approved, it is necessary to update the project indicators based on the steps just completed. Indicators are compared to actuals and used to project resources for the next process.
Management Review	Management is made aware of the projects status and projected costs. Management then decides whether to continue the project, re-accomplish aspects of the current process, or cancel the project.

2.5 Stage Attributes

Introduction 1. This section describes the attributes of a stage.

Context This diagram illustrates the relationship of attributes to the stages within the SEP:



Attributes of a Stage The following table lists the attributes associated with a stage. These attributes are used/defined consistently throughout this document.

Stage Attribute	Description
Purpose	Defines the purpose and objectives of the stage.
Diagram	Illustrates the relationship of the stage to the current process.
Entry Criteria	Lists the criteria that must be complete before the stage can be executed.
Input Summary	Lists the documents and other inputs required for successful completion of the stage.
Activities	Lists the activities to be performed.
Roles and Responsibilities	Lists the roles and responsibilities of the organizational entities required for successful completion of the stage.

Stage Attribute	Description
Product Summary	Lists the products produced at the completion of the stage.
Measurements	Minimum set of measurements to collect in order to evaluate the effectiveness of the activities performed.
Exit Criteria	Lists the criteria that must be satisfied to complete the stage.

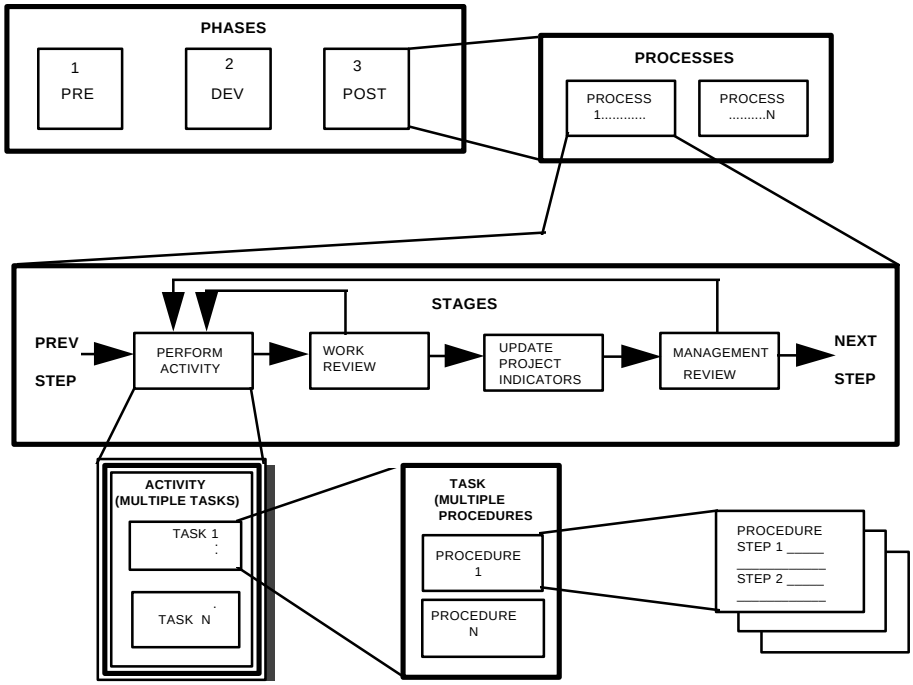
2.6 Activities

Introduction

Activities are logical groupings of work within a process. Activities are the highest level of measurable work within the SEP. Activities are accomplished using a disciplined engineering approach called the "Activity Cycle."

Context

This diagram illustrates the relationship of the Activities to the Stages within the SEP.



Activities

The following table lists examples of activities in the *Project Planning* process

Stage	Activities
Perform Activity	Develop Project Plan Develop Configuration Management Plan Develop Quality Assurance Plan

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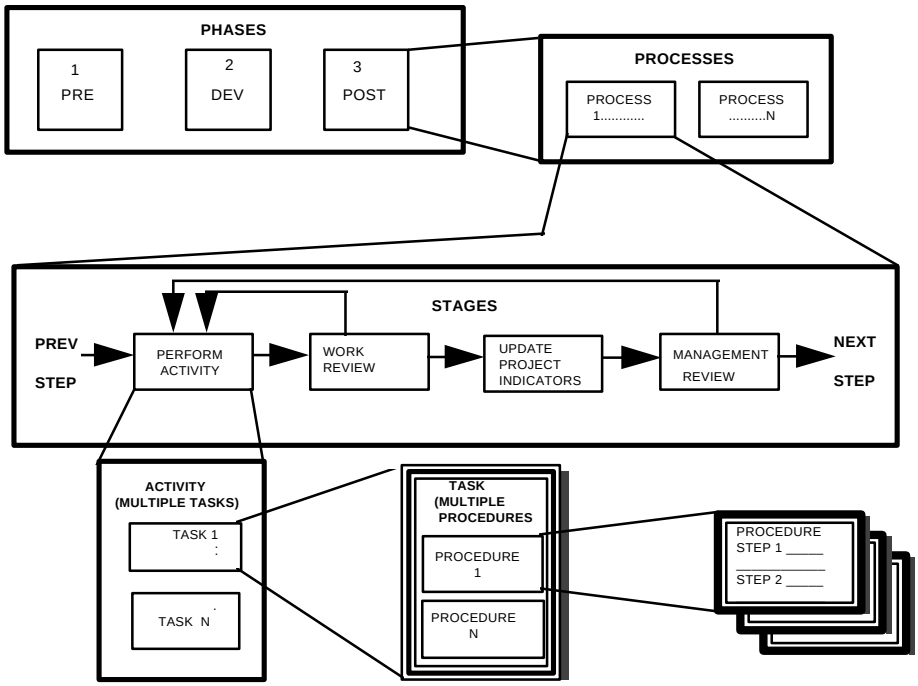
2.7 Tasks and Procedures

Introduction

Tasks and Procedures are step-by-step instructions for performing units of work. They are the lowest level of abstraction in the SEP model. Activities are accomplished by performing their associated Tasks and/or Procedures. The first four levels of the SEP framework (Phases, Processes, Stages, and Activities) are abstractions used by leadership and project managers to plan and track development. They are the "*what to do's*." Tasks and Procedures, on the other hand, are used by project personnel to accomplish the development. They are the "*how to do's*."

Context

This diagram illustrates the relationship of the Tasks and Procedures to the Activities within the SEP.



Tasks

Tasks are units of work within an Activity. The following table is an example of an activity within the *Project Planning* process, Perform Activity stage.

Activity	Associated Tasks
Perform Project Planning Activities	Develop Estimates Develop Detailed Schedule Develop High-Level Scheduling

Procedures

A Task consists of one or more Procedures. The following table is an example of the Task, *Develop Estimates*, which has the following **Procedure** associated with it:

Associated Task	See Procedures
Develop Estimates	Atch 4.1.3-1

Attachments

Atch 2.1-1
SEP Layout

(This attachment is located on the LAN under file SEP.ppt. You may print a hard copy.)

Atch 2.1-1, Continued
SEP Layout

Atch 2.1-1, Continued
SEP Layout

Atch 2.1-1, Continued
SEP Layout

Atch 2.1-1, Continued
SEP Layout

Atch 2.1-1, Continued
SEP Layout

3.0

SSC Directives

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Chapter 3

SSC Directives for Software Development

Overview

Introduction

This chapter spells out the SSC directives for developing software products. These directives lay the foundation for all processes, activities, tasks, and procedures used to develop software products at the SSC.

Scope

These directives and the associated procedures apply to all software development SSC-wide. This document defines standard software development and maintenance activities which are tailored by each project to fit its unique characteristics.

Applicability

The directives contained herein apply to all software development and maintenance efforts regardless of size, nature, or origin (government or contractor development).

OPR

The Office of Primary Responsibility (OPR) is responsible for updating the directives.

In this Chapter

The directives in this chapter are organized as follows:

Directives	Section	OPR
Program/Project Management Approval Authority	3.1	RM
Software Process Assurance	3.2	QIA
Reviews	3.3	SSP
Requirements Management	3.4	RMB
Software Project Planning	3.5	SSP
Software Project Tracking	3.6	SSP
Software Configuration Management	3.7	SSP
Software Design Management	3.8	SSPS
Software Code Management	3.9	SSPS
Software Testing/Product Assurance	3.10	SSQ

continued on next page...

In this Chapter (Cont'd)

Directives	Section	OPR
Software Reuse	3.11	SSBT
Data Standardization	3.12	SSPS
Software Contract Management	3.13	PK
Metrics Management	3.14	QIA
Development Security	3.15	RMMS
Rapid Prototyping/Simulation	3.16	QID

3.1 SSC Program/Project Management Approval Authority Directive

Definitions

Provides the means for categorizing software development requirements within the SSC to determine the approval authority and reviewing official.

There are three management categories as depicted in SSCR 700-3:

- Management Category I
- Management Category II
- Management Category III

Note: SSCR 700-3 was in draft at the time of this printing.

Management Category Goal

The Management Category goal is to:

- Provide management with the approval authority and review official.

OPR

This directive will be maintained by SSC/RM.

Management Directive

SSC directive for management categories are as follows:

Description
The approval authority of the SSC Executive Director is delegated to the SSC organizational elements by way of management categories.
All requirements must be assigned to one of three management categories as depicted in SSCR 700-3.
All Communications-Computer Systems Requirements Documents (CSRDs) generated within, or received from outside the SSC must be processed through the Requirements Processing Working Group (RPWG) and the Communications-Computer Systems Requirement Board (CSRB), as outlined in Chapter 4 of this document.
The SSC Executive Director may upgrade or downgrade a management category of a requirement.

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3.2 SSC Software Process Assurance (SPA) Directive

Definition

A planned and systematic means for assuring management that documented plans, directives, methods, procedures, and standards are being applied effectively during the software engineering process.

SPA provides management with appropriate visibility into the process being used by the software project and of the products being built. This involves reviewing and auditing the software activities and products to verify they comply with this document. Results of these reviews and inspections are provided to the project manager and other appropriate management.

SPA Directive Goals

The SPA goals are to:

- Ensure all software process activities are planned in accordance with this document.
- Verify adherence of software products and activities to the applicable standards, procedures, and requirements.
- Ensure that affected groups and individuals are informed of software process assurance activities and results.
- Ensure non-compliance issues that cannot be resolved within the software project are addressed and resolved by applicable approval authority.

OPR

This directive will be maintained by SSC/QIA.

SPA Directive

The following SSC SPA directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available to perform the Software Engineering Process (SEP) activities.
All software activities and products must adhere to this document.
All projects must work with the SPA group, IAW the SPA plan, as outlined in Appendix I.
SPA plans are placed under configuration control.
All projects' software development plans must be reviewed by the SPA group.

continued on next page...

SPA Directive (Cont'd)

Description
All project personnel understand and receive orientation on the role, responsibility, authority, and value of SPA plan and this document.
Software Process Assurance must be practiced on all software projects.

SPA Group Directive

The following SSC SPA directive applies to the SPA group:

Description
The SPA group must have a reporting channel to senior management, that is independent to the program/project and other support organizations.
Senior Management will periodically review the SPA activities and results.

3.3 Reviews Directive

Definitions

Reviews provide the means for removing defects from the software work products early and efficiently; provide critical technical evaluations; and provide management approval and oversight of scheduled milestones throughout the SSC software engineering process.

There are four categories of reviews:

- Peer Review: A methodical examination of software products by the producers' peers to identify defects and areas where changes are needed.

- Work Review: An in-depth technical evaluation of a project's progress and supporting documentation. This review is conducted at the conclusion of the Perform Activity stage. Approval is required to proceed to the next step of the activity cycle.

- Management Review: A high-level overview presented to management depicting a project's status. This review is conducted at the conclusion of the Update Project Indicators stage. Approval is required to proceed to the next process.

- Program/Special Management Review: Periodic reviews of the status of all programs/projects within the SSC that enables the approval official or other management officials to review the status of a software production effort at any time in the production process.

Review Directive Goals

The Review goals are to:

- Remove defects from the software work products early and efficiently.

- Provide technical integrity and compliance.

- Provide management oversight and continuation approval.

OPR	This directive will be maintained by SSC/SSP.

Review Directive

The following SSC Review Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before review activities are initiated.
Reviews must be conducted in accordance with documented procedures, as outlined in Appendix A of this document.
Work and Management reviews must be held during every process as outlined in Appendix A of this document.
An SMR must be conducted 2 times a year unless otherwise requested by the command section.
All projects must identify a standard set of work products that will undergo peer review.
Reviews must be documented and spot audited on a regular basis by the Software Process Assurance (SPA) group.

3.4 SSC Requirements Management Directive

Definition

Requirements Management establishes a common understanding between the customer and the project office on what will be addressed in the development effort.

Requirement Management Directive Goals

The Requirements Management goals are to ensure:

- Software requirements are controlled to establish a baseline for software engineering and management use.
- Software plans, products, and activities are kept consistent with the software requirements.

OPR

This directive is maintained by SSC/RMB.

Requirement Management Directive

The following SSC Requirements Management directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before Requirements Management activities are initiated.
Software requirement baseline must be documented in accordance with approved procedures, as outlined in Chapter 5 of this document.
Software requirements must include, as a minimum: • agreements, conditions, and contractual terms • technical requirements • interface requirements • acceptance criteria
Software requirements must be documented in a format that is clearly stated, verifiable, traceable, testable, and reusable, as outlined in Chapter 5 of this document.
Software requirements must be reviewed and approved by the applicable approval authority, IAW SSCR 700-3, before they are incorporated into the software effort.
All software requirements must be reviewed and approved by the customer and applicable approval authority before they are incorporated into the allocated baseline.
All software requirements must be maintained under configuration control.

continued on next page...

Requirement Management Directive (Cont'd)

Description
Changes to software requirements must be performed in accordance with documented procedures as outlined in Chapter 5 of this document. Changes must be reflected in associated changes to the project's software plans, products, and activities. All changes must be reviewed, approved, and maintained under configuration control.
Software requirements must be tracked throughout the lifecycle of the software product.
The project manager must review the requirements status in conjunction with scheduled reviews. Minutes or other written proof of the review must be made.
Requirements Management activities must be reviewed by the applicable approval authority as part of the on-going Project Tracking and Oversight function. Concerns must be documented and resolved prior to the next review.

3.5 SSC Software Project Planning (SPP) Directive

Definition

The collection of plans that describe the activities to be performed for the software project. It governs the management of the activities performed by the development team for a software project.

SPP involves developing estimates for the work to be performed, establishing the necessary commitments, and defining a plan to perform the work.

SPP Directive Goals

The SPP goals are to:

- Document software estimates accomplished in accordance with SSC standard estimating procedures for use in planning and tracking the software project.
- Plan and document software project activities and commitments.
- Gain agreement from affected groups and individuals on their commitments related to the software project.

OPR

This directive is maintained by SSC/SSP.

SPP Directive

The following SSC Project Planning directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before software project planning activities are initiated.
All appropriate project plans must be reviewed and approved by the applicable approval authority, as outlined in Chapter 4 of this document.
All software must be developed, documented, and tracked according to an approved software development plan as outlined in Chapter 4 of this document.
Project commitments made to individuals and/or groups external to the SSC must be reviewed and approved by applicable approval authority.
All affected groups internal to the SSC must review and agree to the project's: • size, cost, and schedule estimates • project support • other commitments **Note**: Examples of affected groups include: Quality Assurance, SPA group, Configuration Management, RM, Database Managers, Training, etc.

continued on next page...

SPP Directive (Cont'd)

Description
All size, cost, schedule, and hardware estimates must be performed and documented in accordance with approved procedures as outlined in Chapter 4 of this document.
An approved and documented work breakdown structure (WBS) is required for all software development efforts.
Work must only be planned for approved and documented requirements.
All software development plans must contain as a minimum the following: • project's purpose, scope, goals, and objectives • selection of a software life cycle with predefined stages of manageable size • identification of the selected procedures, methods, and standards for developing and/or maintaining the software • identification of the software work products to be developed • size estimates of the software work products • estimates of the project's effort and cost • estimated use of critical computer resources • project schedule, including milestones and reviews • identification and assessment of the project's risks • plans for engineering facilities and tool support
The project plan detailed schedule must include tasks for site communication layouts, site preparation (electrical, cooling, and construction), and facility security certification/accreditation.
All appropriate project plans, as outlined in Chapter 4 of this document, must be maintained and managed under configuration control.

3.6 SSC Software Project Tracking (SPT) Directive

Definition

SPT provides management with visibility into the actual project's progress so effective actions can be taken when the project's performance deviates significantly from the software plans. This involves tracking and reviewing the project's accomplishments and results against documented estimates, commitments, and plans, and adjusting these plans based on actual accomplishments and results.

SPT Goals

The SPT goals are to:

- Track actual results and performance against the software plans.
- Manage corrective actions to closure when actual results and performance deviate significantly from the software plans.
- Gain agreement from affected groups and individuals on changes to software commitments.

OPR

This directive is maintained by SSC/SSP.

SPT Directive

The following SSC SPT directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available for tracking the project.
Commitments and changes to commitments made to affected individuals and/or groups external or internal to the SSC must be negotiated and approved by the applicable approval authority, in accordance with Chapter 4 procedures.
A project's size, cost, effort, and schedule must be tracked and corrective actions must be taken when necessary. All actions must be reflected in the project's plans, products, and activities. Actions must be reviewed, approved, and documented.
The program manager must conduct periodic internal reviews to track technical progress, plans, performance, and other issues against the software project plans. Results of the reviews must be documented as outlined in Chapter 4 of this document.
Work reviews must be conducted and documented to address the technical completeness of activities performed at selected milestones as outlined in Chapter 4 of this document.
Formal reviews must be conducted and documented to address the accomplishments and results of the software project at selected milestones.

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SPT Directive (Cont'd)

Description
Program/project managers (PMs) must maintain a work breakdown structure (WBS).
Program Managers and the SPA group must track program/projects to ensure milestones are met and measurements are developed and reported.
Program Managers and the SPA group must prepare program/project status reports to ensure senior management is aware of compliance/noncompliance issues.

3.7 SSC Software Configuration Management (SCM) Directive

Definitions

A discipline applying technical administrative direction and surveillance to:

- Identify and document the functional and physical characteristics of configuration items.

- Control changes to configuration items and their related documentation.

- Record and report information needed to manage configuration items effectively, including the status of proposed changes and implementation status of approved changes.

- Audit configuration items to verify conformance to specifications.

Formal SCM: Establishment of formal baselines and change control IAW MIL-STD-973.

Informal SCM: Administrative control of documents, other than baseline documents, that are produced during a system's life.

SCM Directive Goals

The SCM goals are to:

- Plan software configuration management activities.

- Ensure all configuration items are identified, controlled, and available.

- Control changes to identified configuration items.

- Inform affected groups and individuals of the status and content of the software baselines.

OPR

This directive is maintained by SSC/SSP.

SCM Directive The following SSC SCM Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before software configuration management activities are initiated.
Each Automated Data System (ADS) that manages acquisition or operational systems must have a configuration manager assigned either full or part time.
Configuration managers must develop and publish a configuration management plan. The plan must be developed as outlined in Appendix G, Sample-G1.
All projects must have a repository/library for storing key software components and documents.
Changes to configuration items/units must be initiated, reviewed, approved, and tracked.
SCM activities, contents of the baselines, and the status of configuration items/units must be documented, reviewed, and made available to affected groups and individuals.

3.8 SSC Software Design Management Directive

Definitions

Software Design Management involves the consistent act of performing a well-defined engineering process that translates requirements into design activities to produce correct and consistent products effectively and efficiently.

Design Directive Goals

The Software Design Management goals are to:

- Ensure design tasks are defined, integrated, and consistently performed to produce the software within a given methodology.
- Ensure software work products are kept consistent within a given methodology.

OPR

This directive is maintained by SSC/SSPS.

Design Directive

The following SSC Software Design Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before software design activities are initiated.
The software design must be produced, maintained, documented, and verified, according to the project's software development plan, to accommodate the software requirements and to form the framework for coding.
All software designs must be traceable and documented back to the software and functional requirements.
Internal software design reviews must be conducted and documented.
The software design must be technically consistent with the Technical Architecture Framework for Information Management (TAFIM), as outlined in Atch 3.8-1 (Page 3-57).
A mechanism must be used for ensuring traceability between the software detailed design and the code.

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3.9 SSC Software Code Management Directive

Definitions

Software Code Management involves the consistent act of performing a well-defined engineering process that translates the design into coding activities to produce correct and consistent products effectively and efficiently.

Code Directive Goals

The Software Code Management goals are to:

- Ensure coding tasks are defined, integrated, and consistently performed to produce the software within a given methodology.
- Ensure software work products are kept consistent within a given methodology.

OPR

This directive is maintained by SSC/SSPS.

Code Directive

The following SSC Software Code Management Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before software coding activities are initiated.
The software code must be developed, maintained, documented, and verified, according to the project's software development plan.
Each program must coordinate software code error prevention activities, i.e. peer reviews, structured walk-throughs, and software inspections.
The programming language guidance must be used for all new and upgraded software systems, as outlined in Atchs 3.9-1 (Page 3-59) and and 3.9-2 (Page 3-65).
A mechanism must be used for ensuring traceability between the software detailed design and the code.

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3.10 SSC Software Testing/Product Assurance Directive

Definition

A process by which the software, supporting documentation, and implementing directives are evaluated against the requirements and standards prescribed for those products.

Software Product Assurance Directive Goals

The Software Product Assurance goals are to ensure:

- The program manager has real time visibility during the development process to ensure that requirements are satisfied and that errors and discrepancies are detected and corrected as early as possible in the development of the product.
- All products are independently verified and validated before being released to our customers.

OPR

This directive is maintained by SSC/SSQ.

Software Product Assurance Directive

The following SSC Product Assurance directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before software product assurance activities are initiated.
Product Assurance is more than just testing and must encompass the entire software process.
Product evaluations conducted during all technical and peer reviews are the primary product assurance activities for ensuring product quality throughout project development. See SSC Reviews Directive (page 3-51).
Data on defects identified in product assurance activities must be collected, analyzed, and documented for use in management decisions and reviews.
All software and documentation released by SSC must be tested and evaluated as outlined in Chapters 5 and 6 of this document.
Complete product testing and evaluation must be done by the program manager before being released to independent Qualification Test and Evaluation (QT&E).
All products must go through independent QT&E before being released to our customers.

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Software Product Assurance Directive (Cont'd)

Description
All independent QT&E must be conducted, lead, or supervised by Software Quality Assurance (SSQ). For contracted efforts, program managers must negotiate a memorandum of agreement with Quality Assurance to ensure contracted QT&E milestones can be achieved.
All software testing must be traceable, repeatable, and documented.
Test plans, test procedures, and test cases must be placed under configuration control.
Changes to all software products, plans, process descriptions, and activities, as a result of product assurance activities, must be coordinated with the affected groups.
The applicable approval authority must approve or disapprove the release of all software and/or documentation. See SSC Program/Project Management Approval Authority Directive (page 3-47).

3.11 SSC Reuse Directive

Definitions

The practice of either using existing software assets (consumption) or developing new software assets in such a way that they can be utilized in parts of software systems, in addition to the one for which they were originally developed (production).

Reuse Directive Goals

The Reuse goals are to:

- Focus requirements analysis for common application services.
- Increase development productivity (organic and contract).
- Reduce software development/maintenance costs.
- Increase schedule achievability.
- Increase software quality.

OPR

This directive is maintained by SSC/SSBT.

Reuse Directive

The following SSC Reuse Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before reuse activities are initiated.
Reuse must be applied to all phases of the software development life cycle, which includes requirements, design, coding, testing, etc., as outlined in this document.
All software must be designed to make maximum use of existing reusable software.
All projects must develop Reusable Software Assets (RSAs) for subsequent reuse to the maximum feasible extent, recognizing all intellectual property rights.
All projects must check the Air Force Defense Software Repository System (AFDSRS) prior to initiating new requirements, designs, code, and test cases.
All reusable software products must be submitted to the AFDSRS after they are baselined.
All projects must use the guidelines as outlined in Appendix F, Reusable Software Asset Consumption/Production, in developing RSAs.

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Reuse Directive (Cont'd)

Description
Reuse development activities must be highlighted in the software development plan and reported during the reviews.
An abstract must be submitted for all planned RSAs to the AFDSRS as outlined in Appendix F, Reusable Software Consumption Assets/Production, of this document.

3.12 Data Standardization Directive

Definitions

The practice of building and managing reusable DoD standard data elements to greatly improve communications in support of the joint warfighting commanders through system interoperability and elimination of redundant data.

Data Standardization Goals

- Enhance communications through system interoperability.
- Promote data element reuse.
- Reduce software development time and maintenance costs by eliminating redundant data.
- Manage data as an enterprise-wide asset.

OPR

This directive is maintained by SSC/SSPS.

Data Standardization Directive

The following SSC Data Standardization Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before data standardization activities are initiated.
All systems developed or maintained at SSC must transition to the exclusive use of standard data elements.
DoD standard data elements must be used when available.
In the absence of a DoD standard element, an Air Force standard data element must be used.
Newly developed data elements must be submitted by the program/project office to SSC/SSMS for standardization. Data elements must be conditionally approved by SSC/SSMS prior to baseline of the software requirements specification.
Data elements must be developed in accordance with DoD 8320.1-M, 15 Dec 92 (Draft) and DoD 8320.1-M-1, January 1993.
All programs/projects must use the Defense Data Repository System (DDRS), administered by SSC/SSMS, who will assist in developing DoD 8320.1-M and DoD 8320.1-M-1 compliant data elements.

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3.13 SSC Software Contract Management Directive

Definitions

Software Contract Management involves selecting a software contractor, managing the contractor effectively, establishing commitments with the contractor, and tracking and reviewing the contractor's performance and results.

Software Contract Management Goals

- Select qualified software contractors.
- Maintain ongoing communications with contractor.
- Track contractor's actual results and performance against its commitments.

OPR

This directive is maintained by SSC/PK.

Software Contract Mgt Directive

The following SSC Contract Management Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before software contract management activities are initiated.
Work contracted out must be defined and planned in accordance with this document.
Contractual agreement between SSC and contractor must be used as the basis for managing the contract.
A documented contractor's software development plan, as outlined in Chapter 4 of this document, must be reviewed and approved by the applicable approval authority.
Program Managers and the SPA group must monitor the contractor's software quality assurance activities in accordance with this document.
Program Managers must conduct development testing as part of delivery of the contractor's software products.
Program Managers and the SPA group must track the status of activities for managing the software contract to ensure milestones are met and measurements are collected and reported.

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3.14 SSC Metrics Management Directive

Definitions

Measures collected over time, when analyzed, present meaningful information, from which decisions can be made.

Metrics Directive Goals

The Metrics goals are to:

- Perform evaluations - To determine if a process or product is meeting acceptance criteria.
- Control decisions - To plan limits and goals for a process or product and provide visibility to make decisions based on actual measurements versus the plan.
- Develop a database - To provide historical perspective and to provide the data for tools which monitor and make decisions based on measurements.

OPR

This directive is maintained by SSC/QIA.

Metrics Directive

The following SSC Metrics Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before measurements activities are initiated.
All projects must collect a minimum set of measurements as outlined in this document.

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3.15 SSC Development Security Directive

Definition

SSC's oversight of developments to provide for the management, protection, and distribution of sensitive information, both classified and unclassified. The directive requires interpretation of the regulatory (National, DoD, and AF) and operational requirements of the development system to achieve the most cost-effective solutions to confidentiality, availability, and integrity objectives of the customer. Security mechanisms/procedures are based on the needs of the Designated Approving Authority (DAA) and an initial risk assessment in consideration of system threats, clearances of the users (direct and indirect), data sensitivity, system criticality, and cost-benefit analysis. Security must be addressed as a documented operational requirement, identified at the pre-development phase and considered throughout the life cycle of the system to avoid the need for costly retrofits. This directive results from DoD Directive 5200.28, and AF Policy Directive (AFPD) 33-2.

Security Goals

The Security goals are to:

- Recognize the DAA as THE security customer and promotion of DAA participation throughout the development process.
- Identify, document, and address operational security requirements from the pre-development phase and continued throughout the systems life cycle. Operational security requirements are those resulting from or required by the intended use of the information processed, stored, or manipulated in the targeted system(s).
- Develop cost-effective systems which are certifiable and accreditable; and implement National, DoD, and AF security guidance such that risk is mitigated to an acceptable level by the DAA customer.
- Develop and maintain a security risk management process which addresses security throughout each products life cycle.
- Ensure security issues are adequately addressed in all appropriate development, documentation, program reviews, and status briefings.
- Ensure that necessary acquisition/development, testing and deliverable documents verify that security requirements have been satisfied and that the resulting system is certifiable and accreditable within given implementation guidelines.

OPR

This directive is maintained by SSC/RMMS.

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Security Directive

The following SSC Security directive applies SSC-wide:

Description
Identify the system DAA, to include resolution of multiple DAA responsibilities, and ensure DAA involvement beginning with the pre-development phase and continuing throughout the system's life cycle.
Adequate resources, budget, and training must be available before development security activities are initiated.
All software must be developed, documented, and tracked according to an approved software development plan as outlined in Chapter 4 of this document.
A project/program security manager must be appointed for each development effort, familiar with AFPD 33-2, and held accountable for development security issues and associated risk management. Systems destined to process classified data or those with significant security concerns require a full-time project/program security manager. Primary source of project/program security manager assistance is RMMS.
Commitments for support from external activities like the Air Force Information Warfare Center (AFIWC), Center for Information Systems Security (CISS), etc., must be coordinated with RMMS to eliminate costly duplication of effort and misunderstandings.
The program manager must perform a detailed system risk analysis, to include a Security Test and Evaluation (ST&E); develop thorough certification packages; and produce appropriate users security instructions (Trusted Facilities Manuals, Security Features User's Guide, etc.).
Program/Project Managers must be familiar with security responsibilities as outlined in AFPD 33-2 and AFSSI 5102.
Security risk management must be a continuous development cycle process to ensure mitigation of risk to an acceptable level by the DAA customer. A risk analysis process, to include ST&E, should occur throughout the project's life cycle. The risk analysis will identify satisfaction of security requirements, locate shortfalls, and determine residual risks (that portion of risk that remains after applying a set of security measures). Residual risks must be evaluated with the DAA to determine if they are acceptable or if additional countermeasures must be incorporated prior to program manager certification.
The program manager, in review with the DAA, must certify the extent to which the implemented security mechanisms satisfy the specified security requirements. Additionally, the development DAA must review the certification package to determine if the system's residual risks are acceptable within the guidelines of the security implementation package to warrant release, i.e. certify that the system is accreditable.

3.16 SSC Rapid Prototyping/Simulation Directive

Definition

Prototyping enables the developer to create a model of the software very quickly through customer and analyst improvement, interaction, experimentation, and demonstration. The developer and customer meet and define the overall objectives for the software, identify whatever requirements are known, and outline areas where further definition is needed. A basic model system is built from initial customer specifications. The customer then evaluates the demonstrated prototyped system. The prototyped system is modified accordingly and the customer again reviews for further refinement. A process of iteration occurs as the prototype is "refined" to satisfy the needs of the customer, while at the same time, it helps the developer better understand what needs to be done.

Prototyping is highly encouraged for applications that create dynamic visual displays, interact heavily with humans, involve simulation modeling, or require algorithm calculations. However, these application areas must be weighed against application complexity.

Simulation is a process used to ensure that the prototype is comprehensive, accurate, and functional. Simulation allows the developer to analyze the system's performance and gain an understanding of the prototype's behavior. Effective simulation requires an environment as close as possible to the target operational environment.

Rapid Prototyping/ Simulation Goals

- Produces a working model of the system very quickly through customer and analyst improvement, interaction, experimentation, and demonstration.
- Helps the developer better understand the customer requirements.
- Allows developer to analyze the system's performance and gain an understanding of the system's behavior.

OPR

This directive is maintained by SSC/QID.

Rapid Prototyping/ Simulation Directive

The following SSC Rapid Prototyping/Simulation Directive applies SSC-wide:

Description
Adequate resources, budget, and training must be available before a prototype is designed.
A cost/benefit assessment must be developed in order to determine if the project is feasible for prototyping.
The use of prototyping must be addressed in the Software Development Plan (SDP) and become part of the milestone tracking.
The customer must be involved in the evaluation and refinement of the prototype.
The simulation environment must be as close as possible to the target operational environment.

(Pages 3-37 thru 3-55 reserved for future use)

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Attachments

Atch 3.8-1
The Technical Architecture Framework for Information Management (TAFIM)

(Contact SSC/QIDM, 6-4021, for a hard copy. This is a policy letter on Technical Architecture Framework for Information Management (TAFIM)).

Atch 3.8-1, Continued
The Technical Architecture Framework for Information Management (TAFIM)

Atch 3.9-1
Air Force Policy on Programming Languages

(This is a policy letter. Contact SSC/QIDM, 6-4021, for a hard copy)

Atch 3.9-1, Continued
Air Force Policy on Programming Languages

Atch 3.9-1, Continued
Air Force Policy on Programming Languages

Atch 3.9-1, Continued
Air Force Policy on Programming Languages

Atch 3.9-1, Continued
Air Force Policy on Programming Languages

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Atch 3.9-2
Interpretation of FY 91 DOD Appropriations Act

(This is a policy letter. Contact SSC/QIDM, 6-4021, for a hard copy)

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4.0

The Pre-Development Phase

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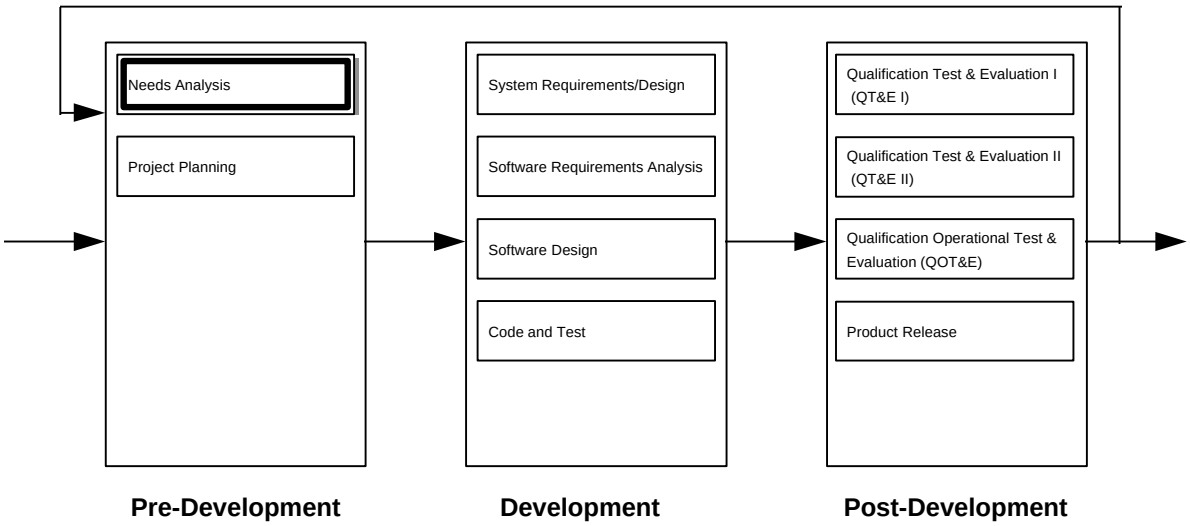
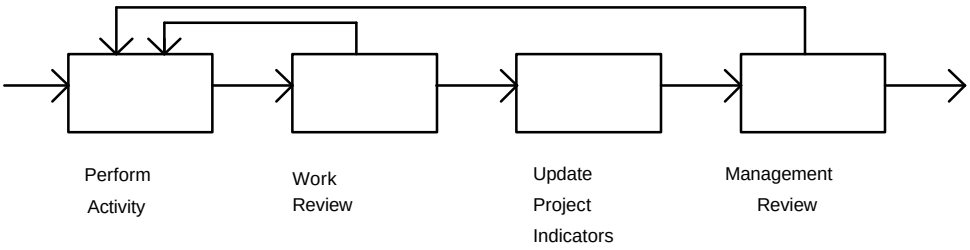
4.1 Needs Analysis: Overview

Definition: The Needs Analysis is the beginning of service to the customer. It is in this process that the customer's initial request(s) is documented and analyzed.

Where We Are This diagram illustrates where the Needs Analysis process fits in relation to the overall software engineering process.



Stages to Follow This diagram delineates the 4 stages required to complete the Needs Analysis process.



In This Section The specific Needs Analysis stages will be covered in the following sections.

Stages	Section
Perform Stage	4.1.1
Work Review	4.1.2
Update Project Indicators	4.1.3
Management Review	4.1.4

4.1.1 Needs Analysis: Perform Activity

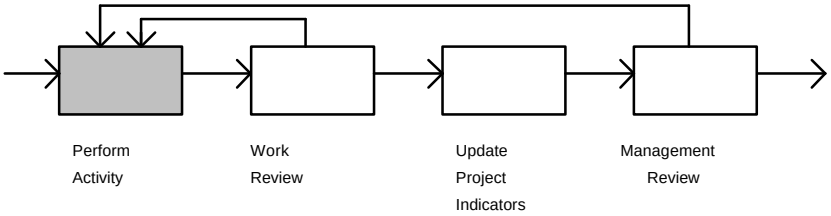
Purpose

The purpose of this step is to:

Establish pre-development processing procedures of Communication-Computer Systems Requirements (CCSR) within the Standard Systems Center.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	A business case analysis (i.e. IDEF0) has been completed by the user IAW DoD 8020.1-M (see Functional Process Improvement Strategies, Appendix J).
	A lead DAA for security has been established.
	An approved directive/requirement has been received.

Input Summary

The following input(s) are required for this stage.

Input	Description
Approved Directive/Documented Requirement	Must be in the form of a requirements document, e.g., CSRD, PMD, ORD, MNS, SOW, written suggestion etc.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Preparation	Process Communications-Computer System Requirements Document (CSRD) - Submit CSRD to SSC/RMBT - Assign a Resource Management Project Officer - Initialize an ADS Folder All requirements (including PMDs, MNSs, or ORDs) should be routed through the security office (SSC/RMMS).	SSCR 700-3 (Contact SSC/RM)
Conduct Program Start Review (PSR) (Strategic Roundtable)	Before starting the PSR: - Conduct Security Risk Assessment - Identify DAA - Discuss key issues with functional experts - Conduct a manpower assessment - Create a preliminary program schedule - Assess technology availability - Prepare a chart briefing using the ESC Training Guide charts as samples PSR is composed of SSC command staff, key functional staff directors, and the user, to include a DAA representive. - Program Manager briefs Roundtable members on requirements, technology assessment, technical alternatives, cost and schedule baseline, and initial strategy - Members advise on alternatives and issues based on their experience Obtain approval from SSC/ED/EV/EA to commit resources and proceed	DoDD 5200.28, Encl. 4 AFMC Pamplet 800-7 ESC Training Guide, 31 Jan 93 ESC/CC letters, 21 May 93, 23 Sep 92, 11 Jan 93 ESC/CV letter, 4 Feb 92
Prepare Initial Documents	Review Needs Analysis Tailoring Develop Program Management Plan (PMP) (To include applicable plans in the Project Planning Perform Activity of the SEP) - Establish a lead DAA if not previously done Prepare Operational Concept Document (OCD) if not previously done - To include system security policy (AFSSI 5001) Perform Software Reengineering Assessment Review directives in Chapter 3 of the SEP Identify lead base(s) for prototype and testing field (QT&E-II)	Appendix D AFR 800-2 Atch 4.1.1-1 (Page 4-113) MIL-HDBK-SRAH (Page 3-3)

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Activities (Cont'd)

Activity	Associated Tasks	See Procedures
Analysis	Conduct Needs Analysis - Analyze Communications-Computer System Requirements Document (CSRD) - Conduct the analysis: -- Technical Analysis and Cost Estimate (TACE) --- The Center technical director will review technical approach -- Operational security needs analysis	 SSCR 700-3 Contact SSC/RMMS
	-- Domain Analysis	Contact SSC/SSB
	-- Risk Analysis: --- Technical --- Programatic --- Supportability --- Cost and Schedule	SEI-93-TR-6
	-- Security Risk Analysis	AFPD 33-2 AFSSM 5018
	-- In-house/Contractor Analysis	SSCR 700-3
	-- Lease/Purchase Analysis	SSCR 700-3
	-- Level of Effort Baseline	DoDI 7920.4 SSCR 700-3
	-- POM Documentation	DoD-STD 7045.7
	-- Impact on Existing Workload	
	-- SSC support facilities (Hardware Operations, LANs, Test Release)	OP Operating Instructions

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support Needs Analysis activities.

Role	Responsibility
SSC/RMB	Provide traceability, visibility, and oversight of each Communication-Computer Systems Requirements (CCSR) throughout the Pre-Development Phase. With assistance from the SSC organization, ensure that each CCSR will have corporate agreement based upon applicable and consistent analysis.
Project Office	Responsible for coordinating with the user and support offices to ensure the requirement is complete, consistent, and accurate; and conducting the Program Start Review (Strategic Roundtable).
Support Offices	Provide support to the project offices as needed (see Appendix E).
Functional User	Provides requirement document.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed, IAW the SPA plan (see Appendix I).
Designated Approving Authority (DAA)	Ultimate security customer, responsible for determining acceptability of the developed system or network for operation at an acceptable level-of-risk.

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Program Management Plan (PMP)	An overall plan to establish program responsibilities.
Operational Concept Document (OCD)	A description of a proposed system in terms of the user needs it will fulfill, relationship to existing systems or procedures, and the ways it will be used.
Software Reengineering Assessment Documentation	All documents used to conduct the assessment, i.e. technical and economic analysis worksheets, and results from tools used in the analysis.
Technical Analysis and Cost Estimate (TACE)	A study to determine whether a requirement can be implemented with the current resources and technology.
Risk Analysis	An interactive process providing information on aspects of a system that need protecting, threats with an impact on the system, how well the system can be protected against those threats, how to improve system security and at what cost, and what residual risk would remain.
In-house/Contractor Analysis	A study to determine the feasibility of whether to develop software in-house or contract the requirement to outside sources.
Lease/Purchase Analysis	A study to determine the feasibility of lease versus purchase of equipment and/or software.
Level of Effort Baseline	The amount of program resources to be applied against the projected workload.
Program Objective Memorandum (POM) Documentation	Input required into the Biennial Planning, Programming, and Budget System cycle.
System Security Policy (Included in the OCD)	A set of laws, rules, and practices regulating how the using organization must manage, protect, and distribute the sensitive information process, stored, or manipulated by the target system. It interprets regulatory/operational requirements of the target system, states how that system will satisfy those requirements, and drives security feature selection/system design to meet confidentiality, availability, and integrity goals.
Domain Definition/Reuse Products	A "group" or "family" of related products that share a set of common capabilities and/or data.

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Number of hours expended in the analysis and tracking of the requirement.

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	The user need/requirement is reviewed, analyzed; PMP, OCD.
	Approval has been given to commit resources.
	The Designated Approval Authority (DAA) has been identified.
	Project and system security risks are identified, documented, and their impact assessed and results are ready to be presented to the user during Work Review.

4.1.2 Needs Analysis Work Review

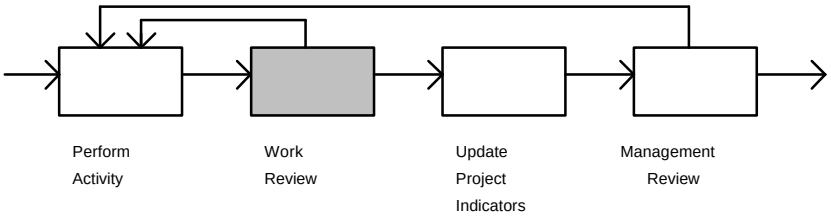
Purpose

The purpose of this review is to ensure that:

1. Appropriate support and functional organizations have been identified and given the opportunity to assess the technical content of the user's requirement.
2. User's requirements are documented in terms that are complete, consistent, unambiguous, feasible, and testable.
3. Technical risks are identified and documented.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The user need/requirement has been reviewed, analyzed, and all appropriate activities completed.
	Project risks have been identified, documented, and their impact assessed and results are presented to the user during Work Review.
	Funding and resources have been allocated.
	A Technical Analysis and Cost Estimate has been completed by the user IAW SSCR 700-3.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Directive/Documented Requirement	CSRD, PMD, ORD, MNS, SOW, written suggestion, etc.
Support Studies	All appropriate analysis conducted in the previous stage.
SPA Plan	Procedures and policy for software process adherence IAW the SPA plan.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedure
Review Preparation	Develop and Distribute review package	Appendix A (Page A-10)
Conduct Review	Review draft documents IAW the SSC Work Review Procedures. Materials to review include: - Requirements Documents -- Communications-Computer System Document (CSRD) -- Program Management Plan -- Operational Concept Document --- System Security Policy - Analyze Products -- Feasibility Study -- Technical Analysis and Cost Estimate -- Level of Effort Baseline -- Lease-Purchase Analysis -- Manpower Estimates -- Workload Impacts -- Security Risk Assessment - POM Support Documents - Project and Security Risk Analysis	Appendix A (Page A-14)
Review Follow-up	Track, address, and publish review issues Develop review minutes package Distribute review minutes package	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Presents review material
Functional OPR	Represents functional viewpoint
Review Panel	Review material
Support OCRs	Support review panel, as needed, on specific items
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced or reviewed in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Directive/Documented Requirement	CSRD, PMD, ORD, MNS, SOW, etc.
Studies	All appropriate analysis conducted on the requirement.
Technical Risks	Technical risks identified during the review including system security risks.
Review Defect Report	Defects identified during the review.
Review Action Items	Action Items taken during the review.
Review Minutes	Minutes of the review.
Review Recommendation	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Schedule	Hours expended categorized by: - project office preparation - review preparation - conduct of the review (length)
Requirement	Defects, errors, and/or omission found during the review.

Exit Criteria The requirements have been technically reviewed.

IF Review Panel ...	THEN ...
Approves Technical Content	Project proceeds to the Update Management Indicators stage.
Disapproves Technical Content	The requirements package is recycled to the Needs Analysis Perform stage for further refinement.

4.1.3 Needs Analysis: Update Project Indicators

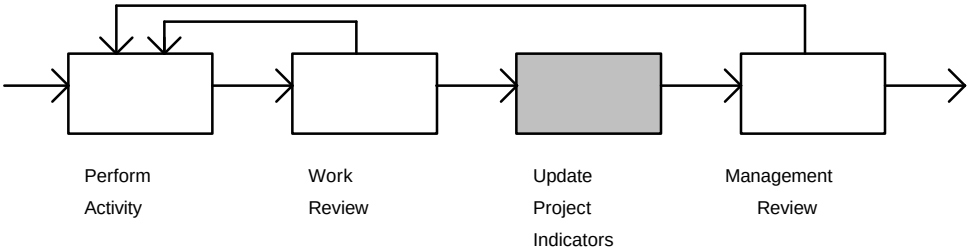
Purpose

The purpose of this process is to:

1. Update project management indicators (size, cost, and schedule)
2. Evaluate project risks and assess impact

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The user's requirement has been documented and reviewed.
	Funding and resources have been allocated.
	A Technical Analysis and Cost Estimate has been completed by the user IAW SSCR 700-3.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Directive/Documented Requirement	CSRD, PMD, ORD, MNS, SOW, etc.
Estimation Documentation	Size, cost, schedule and risk analysis.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedure
Estimate Size, Schedule, and Cost	Develop estimates All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures.	Atch 4.1.3-1 (Page 4-114)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Performs activities associated with this process.
Support Offices	Provide support as requested by the Project Office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan. (see Appendix I)

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Size Estimate	Initial Size Estimate
Cost Estimate	Initial Cost Estimate
Schedule Estimate	Initial Schedule Estimate
Manpower Requirements	Initial Manpower Requirements
Risk Analysis Report	Initial Risk Analysis Report

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Schedule	Number of man-hours expended Estimated schedules and elapsed time in weeks, months, and /or years
Size	Differences between initial and revised estimates Current estimate in Function Points

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Initial project size, cost, and schedule estimates have been developed.
	Project and system security risks have been evaluated and their impact assessed.

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4.1.4 Needs Analysis: Management Review (Initial Requirements Review) (Milestone 0, DoDD 5000.1)

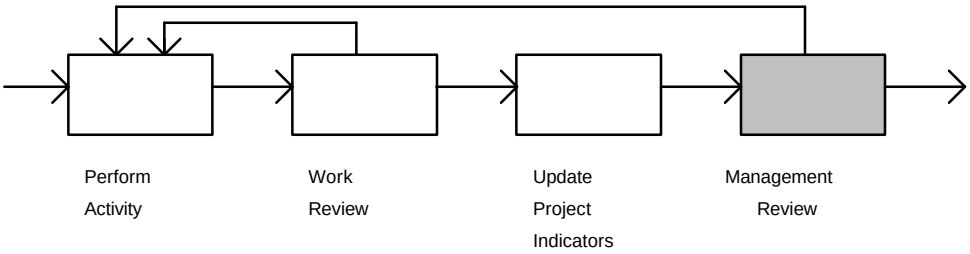
Purpose

The purpose of this review is to:

1. Provide management visibility
2. Approve/disapprove the requirements document (i.e. CSRD)
3. Review initial project size, cost, and schedule estimate
4. Review project risk areas
5. Approve/disapprove continuation of the project
6. Approve and allocate resources and funding to accomplish the next phase
7. Assign implementation to appropriate organization
8. Establish the Commitment Baseline

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The initial requirements have been defined, analyzed, reviewed, and documented.
	Initial project size, cost, and schedule estimates have been accomplished.
	Project and system security risks have been analyzed and their impact assessed.
	Funding and resources have been allocated.
	A Technical Analysis and Cost Estimate has been completed by the user IAW SSCR 700-3.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Requirements Package	CSRD, PMD, OCD, MNS, SOW, security requirement document, and support studies
Initial Project Estimates	Size, Cost, Schedule
Project Risks	Risk Management Plan
Work Review Minutes	Minutes from the Work Review.
Work Review Action Items	List of all Action Items from the Work Review.
Work Review Recommendation	Recommendation from the Work Review.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedure
Review Preparation	Develop and Distribute review package	Appendix A (Page A-10)
Conduct the Review	Review documents IAW the SSC Management Review Procedures. Material to review include: -- Overview of Project Management Plan -- Overview of Operational Concept Document (to include system security policy) -- Overview Work Review -- Program Funding Requirements -- Manpower Requirements; Direct, Support, Overhead, and Functional) Recommendations/Action Items - Status of effort expended to date - Resources Impact and Costs - Near-term Schedule Decisions to make: - Commit resources	Appendix A (Page A-14)
Review Follow-up	- Identify and document project risks Approval Authority to make following decisions: -- Determination of commitment baseline -- Project Continuation Approval or Disapproval	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Approval Authority)	Presides, Approves/Disapproves
Project Office	Presents review material to management
Review Panel	Assist Management in the decision process
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Approved Baseline	Requirement baseline (OCD, PMP).	F
Project Management Risks	Management risks identified during the review.	I
Review Defect Report	Defects identified during the review.	I
Review Action Items	Action Items taken during the review.	I
Review Minutes	Minutes of the review.	I
Approval Authority's Decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	I

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Schedule	Hours expended categorized by: - Project Office Preparation - Reviewer Preparation - Conduct of the Review
Requirement	Number of action items assigned by the Approval Authority

Exit Criteria

Management has committed to allocate resources to implement the requirement. Otherwise, the requirement is recycled through the Needs Analysis process or canceled.

IF Approval Authority ...	THEN ...
Approves Continuation	The project proceeds to the Project Planning phase.
Disapproves Continuation	The requirements package is recycled to the Needs Analysis Perform stage for further refinement.
Cancels Project	Refer to Cancellation process (see Appendix H).

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4.2 Project Planning: Overview

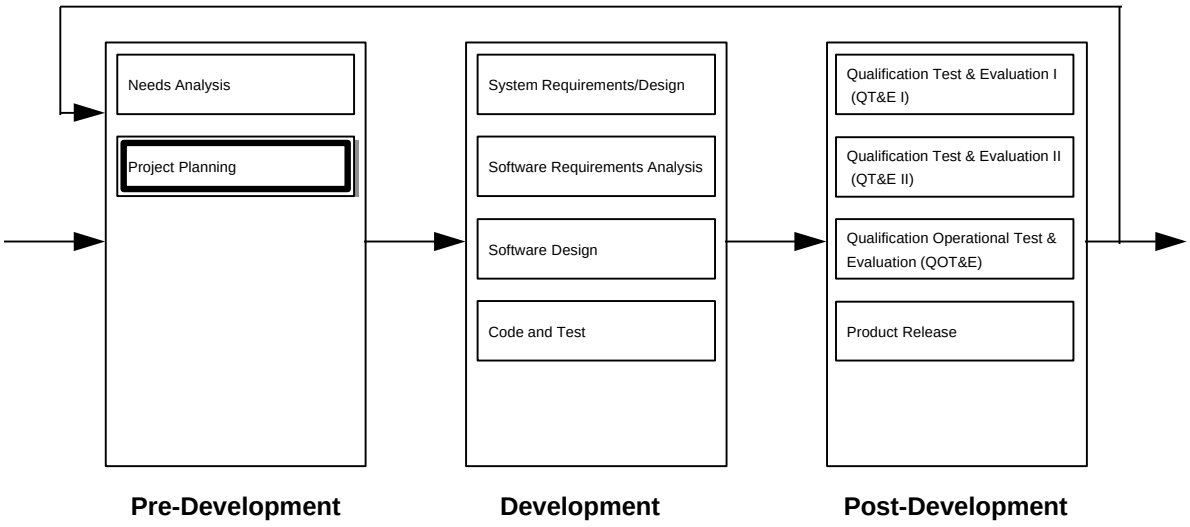
Purpose

"Planning is deciding in advance what to do, how to do it, when to do it, and who is to do it" [Koontz and O'Donnel, 1972].

Software project planning involves developing estimates for the work to be performed, establishing the necessary commitments, and defining the plan to perform the work. A plan is established to address the commitments to the customer according to resources, constraints, and capabilities of the project. The plan provides the basis for initiating the software effort and managing the progress of work.

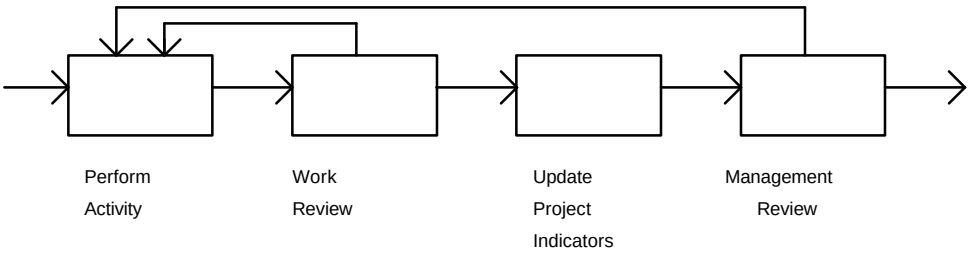
Where We Are

This diagram illustrates where the Project Planning process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete Project Planning process.



In This Section The specific Project Planning stages will be covered in the following sections.

Project Planning Stages	Section
Perform Activities	4.2.1
Work Review	4.2.2
Update Project Indicators	4.2.3
Management Review	4.2.4

4.2.1 Project Planning: Perform Activity

Purpose

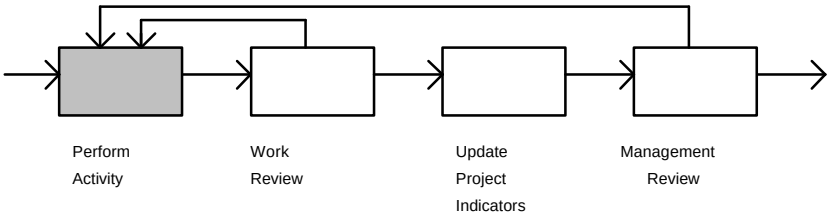
During this process of Project Planning, the plans used to manage the development of the software are produced. Before work is begun, the project needs to fully comprehend the extent of resources and time required to complete required software development activities.

The purposes of developing plans are to:

1. Gain authorization for SSC resources to satisfy an approved requirement.
2. Identify key resources to satisfy an approved requirement
3. Identify key decisions
4. Identify key participants
5. Assign responsibility
6. Identify SSC actions necessary to develop and implement the approved requirement

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Communications-Computer System Requirement Document (CSRD) has been approved.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Approved Directive/Requirements Document	Usually in the form of a PMP, OCD.
Operations Requirements Document	The overall mission area, the type of system proposed, and the anticipated operational and support concepts in sufficient detail for program and logistics support planning.
Technical Analysis and Cost Estimate	A study to determine whether a requirement can be implemented with the current resources and technology.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Software Engineering Process (SEP) Tailoring Guide	Review the SEP Tailoring Guide	Appendix D
Allocate Project Resources	Identify Resources Develop Project Manager Procedures	Atch 4.2.1-1 (Page 4-118)
Coordinate with support offices	Ensure resources are available to complete the project	Appendix E
Perform Project Planning Activities	Develop estimates -- Negotiate all estimates with affected groups Develop high-level scheduling Develop detailed schedule Develop the following plans: - Software Development Plan -- Considerations: Software Program Life Cycle Strategies; Rapid Prototyping, and Simulations -- Include system architecture (The SSC Engineering Directorate will approve/disapprove system architecture -- Estimate effort and cost	Atch 4.1.3-1 (Page 4-114) Atch 4.2.1-2 (Page 4-53) Atch 4.2.1-3 (Page 4-cxxi) Appendix L Atch 5.4.2-2 (Page 5-129) Atch 5.3.1-1 (Page 5-117)

continued on next page...

Activities (Cont'd)

Activity	Associated Tasks	See Procedures
Perform Project Planning Activities (Cont'd)	-- Include a plan for site communication layouts, site preparation and facility security certification/accreditation Identify logistics requirements Develop the following plans: - Software Configuration Management Plan - Software Process Assurance Plan - Test and Evaluation Master Plan - Systems Training Plan - Computer Resources Life Cycle Management Plan - Integrated Logistics Support Plan - Software Support Plan - System Security Plan - Security Test and Evaluation Plan Draft Interface Requirements Agreement	 Appendix K (See below list for procedures/ format to the adjacent list of plans).
Formally Document Project Plans	Software Development Plan Software Configuration Management Plan Software Process Assurance Plan Test and Evaluation Master Plan Systems Training Plan Computer Resources Life Cycle Management Plan Integrated Logistics Support Plan Software Support Plan System Security Plan Security Test and Evaluation Plan Draft Interface Requirements Agreement	* MIL-STD-SDD (in the LAN SEP directory) Appendix G Appendix I DoDD 5000.2M, Part 7 DoDI 5000.2 Appendix K DoDI 5000.2 * MIL-STD-SDD AFSSM 5025 Atch 5.1.1-1 (Page 5-103)

*** Note:** MIL-STD-SDD is scheduled to be numbered MIL-STD-498.

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Develops project plans.
Support Offices	Provide technical assistance in the development of the plans. - SSC/SSP (Logistics) provides logistics/Computer Resources Support.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).
Functional OPR	Provides functional information for the system.
Air Education and Training Command (AETC)	Provides the necessary training/education planning to the project office.
Engineering Directorate	Provides approval/disapproval of all system technical approaches, including system architecture and hardware purchases.

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Appropriate Project Plans	To include as a minimum: - Software Development Plan - Software Configuration Management Plan - Software Process Assurance Plan - Test and Evaluation Master Plan - Integrated Logistics Support Plan - Systems Training Plan - Computer Resources Life Cycle Management Plan - Software Support Plan - System Security Plan - Security Test and Evaluation Plan - Draft Interface Requirements Agreement

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Schedule	Number of man-hours expended in this stage

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Required plans have been produced.
	A core project team has been assigned and trained.
	Project and system security risks have been identified, documented and the impact assessed.
	All estimates are documented for project planning and tracking.
	All project activities and commitments are planned and documented.
	All affected individuals and/or groups agree to commitments related to the project.

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4.2.2 Project Planning Work Review

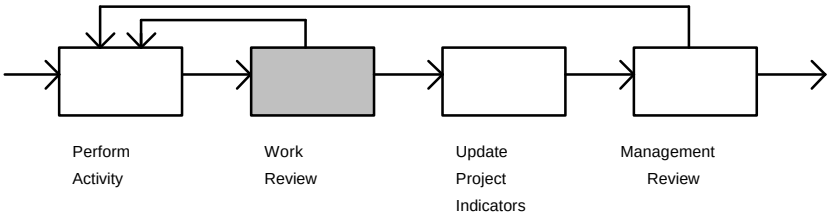
Purpose

The purpose of this review is to ensure that:

1. Appropriate support and functional organizations are identified and given the opportunity to assess the technical content of the project plans
2. Project plans are reviewed for technical content:
   - documented in accordance with SSC policies, procedures, and standards
   - stated in terms that are complete, consistent, unambiguous, feasible, and testable
3. Technical risks are identified and documented

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The required project plans are documented.
	Funding and resources are allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Draft Project Plans	All plans developed during this stage.
Review Checklist and/or Questionnaire	Any questionnaire or checklist tools developed to assist the review process.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedure
Review Preparation	Develop and Distribute review package	Appendix A (Page A-10)
Conduct the Review	Review documents IAW SSC Work Review Procedures Material to review include: - Project Plans (to include as a minimum) -- Software Development Plan -- Software Configuration Management Plan -- Test and Evaluation Master Plan -- Integrated Logistics Support Plan -- Computer Resources Life Cycle Management Plan (CRLCMP) -- System Security Plan -- Security Test and Evaluation Plan	Appendix A (Page A-14)
	Ensure that the following requirement areas are addressed in the project plans: Project Schedules: - Near-term Detailed Schedule - Long-term Schedule	Appendix A (Page A-14)
Review Follow-up	Track, address, and publish review issues Develop review minutes package Distribute review minutes package	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Presents project plans for review
Functional OPR	Represents functional viewpoint in review
Review Panel	Reviews material
Support OCRs	Support review panel, as needed, on specific items
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Technical Risks	Technical risks identified during the review including system security risks.
Review Defect Report	Defects identified during the review.
Review Action Items	Action items taken during the review.
Review Minutes	Minutes of the review.
Review Recommendation	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Schedule	Hours expended categorized by: - Project office preparation - Reviewer preparation - Conduct of the review (length)
Requirements	Defects, errors, and omissions found during the review.

Exit Criteria

The required plans have been technically reviewed.

IF Review Panel ...	THEN ...
Approves Technical Content	Project proceeds to Update Project Indicators stage.
Disapproves Technical Content	The project plans are recycled to the Project Planning Perform stage for further refinement.

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4.2.3 Project Planning: Update Project Indicators

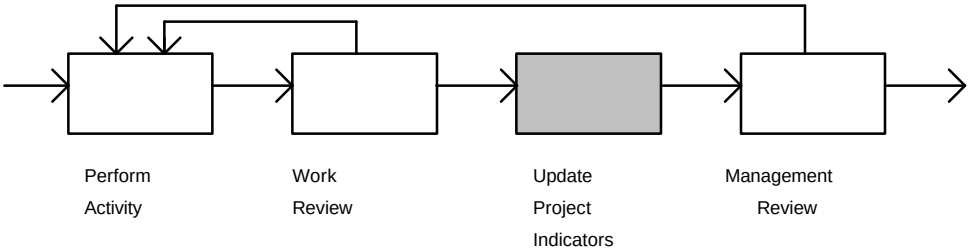
Purpose

The purpose of this stage is to:

1. Update project management indicators (size, cost, and schedule)
2. Evaluate project risk and assess impact

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	All required project plans have been developed and reviewed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Project Plans	All plans associated with the project.
Previous Estimation Procedures	Size, cost, and schedule estimates.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-44)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Performs activities associated with this process.
Support Offices	Provide support as requested by Project Office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Size Estimate	Revised size estimate.
Cost Estimate	Revised cost estimate.
Schedule Estimate	Revised schedule estimate
Risk Analysis Report	Revised risk analysis.

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Schedule	Estimated schedules and elapsed time in weeks, months, and/or years
Requirement	Number of action items assigned by the Approval Authority Percent of elapsed schedule

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.
	Project and system security risks have been re-evaluated and their impacts assessed.

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4.2.4 Project Planning: Management Review (System Requirements Review) (Milestone I, DoDD 5000.1)

Purpose

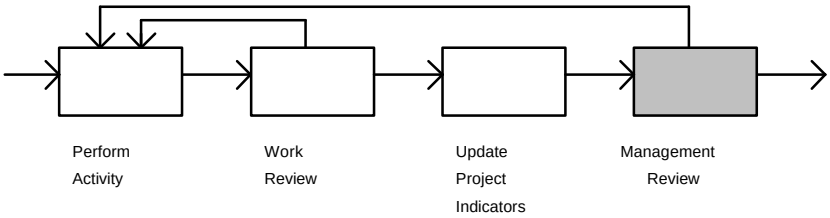
The purpose of this review is to:

1. Provide management visibility of key quality and performance indicators.
2. Obtain approval/disapproval of the project planning documents.
3. Review initial project size, cost, and schedule estimates.
4. Review project risk areas.
5. Approve/disapprove continuation of the project
6. Approve and allocate resources and funding to accomplish the next phase.

During this stage, management approves/disapproves the continuation of the project based on revised size, cost, and schedule estimate, and technical feasibility.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The project plans have been defined, analyzed, reviewed, and documented.
	Project size, cost, and schedule estimates have been revised based on the project plans.
	Project and system security risks have been analyzed and their impacts assessed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Requirements Package	Requirements and support studies
Project Plans	All plans associated with the project.
Revised Project Management Estimates	Size, cost, and schedule
Project and System Security Risks	Revised project and system security risk analysis.
Work Review Minutes	Minutes from the Work Review.
Work Review Action Items	List of all Action Items from the Work Review.
Work Review Recommendation	Recommendation from the Work Review.

Activities The following activities are performing during this stage.

Activity	Associated Tasks	See Procedure
Review Preparation	Develop and Distribute review package	Appendix A (Page A-10)
Conduct the Review	Review documents IAW SSC management's review procedures. Material to review include: - Overview of Project Plans (to include as a minimum) -- Software Development Plan -- Software Configuration Management Plan -- Test and Evaluation Master Plan -- Integrated Logistics Support Plan -- Computer Resources Life Cycle Management Plan (CRLCMP) -- System Security Plan -- Security Test and Evaluation Plan - Requirements -- Program Funding Requirements -- Manpower Requirements (to include: direct , support, overhead, and functional) - Overview of Work Review -- Recommendations/Action Items/Risks - Status of effort expended to date - Resources impact and costs Review and Approve Project Management Estimates and plans: - Project Size Estimates - Project Cost Estimates - Project Schedules -- Near-term Detail Schedule -- Long-term Schedule Decisions to make: -- Approve schedule estimates	Appendix A (Page A-14)
Review Follow-up	Track, address, and publish review issues Develop review minutes package Distribute review minutes package	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Appropriate Approval Authority)	Preside, Approve/Disapprove
Project Office	Presents review material to management
Review Panel	Assists Management in the decision process
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Project Plans	Becomes the project management baseline.	F
Approved Revised Project Estimates	Revised size, cost, and schedule estimates.	I
Project Management Risks	Management risks identified during the review.	I
Review Defect Report	Defects identified during the review.	I
Review Action Items	Action Items taken during the review.	I
Review Minutes	Minutes of the review.	I
Approval Authority's Continuation Decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	I

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Schedule	Hours expended categorized by: - Project Office Preparation - Reviewer Preparation - Conduct of the Review - Estimated schedules and elapsed time in weeks, months, and/or years

Exit Criteria

Management has to commit to allocation resources to implement the project plans. The project plans are baselined. Otherwise, the project plans are recycled through the Project Planning - Perform stage or the project is canceled.

IF Approval Authority ...	THEN ...
Approves Continuation	The project proceeds to the Development phase.
Disapproves Continuation	The project plans document and associated material are recycled to the Project Planning Perform stage for further refinement.
Cancels Project	Refer to Cancellation process (see Appendix H).

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Atch 4.1.1-1
Operational Concept Document (OCD)

Procedures

The following table outlines the procedures necessary to prepare an Operational Concept Document (OCD).

√	**Procedures**
	Base the OCD on the broad requirements of an Operational Requirements Document or a Communications-Computer System Requirements Document
	Include users who currently perform, or will perform, the functions described in the OCD on a regular basis, especially the end user
	Ensure the document describes specific functional requirements and contains clear, concise, and accurate information
	Obtain a consensus among development, support and user agencies and contractors on the operational (function) concept of the proposed system
	Sample instructions for completing an OCD are in MIL-STD-SDD.

Atch 4.1.3-1
Develop Estimates

Procedures This table outlines the procedures to follow in order to develop project estimates.

√	Procedures
	The following activities should be developed in estimating and scheduling: • **Work Breakdown Structure** (Ref: MIL-STD-881B"Work Breakdown Structures for Defense Material Items"; See Atch 4.1.3-1(a)) 1. Review MIL-STD-881B 2. Develop Work Breakdown Structure IAW MIL-STD-881B • **Risk Management** (Refs: Risk Management, Text and Cases, Green and Serbein, 1978; SEI-93-TR-6) 1. Review Risk Management Guide and Textbook 2. Develop Risk Management Plan 3. Manage to the Risk Management Plan • **Software Size** (Refs: Function Point Counting Practices Manual, Release 3.1, International Function Point User Group; Function Point Tips and Techniques, SSC Internal Document; *There are two approved methods for determining software size:* 1. Function Points a. Review Function Point reference material b. Obtain training if not familiar with Function Point counting c. Follow Function Point counting procedures 2. Lines of Code a. Review Lines of Code Counting reference material b. Obtain training if not familiar with Lines of Code counting c. Follow Lines of Code counting procedures

Atch 4.1.3-1(a)
Work Breakdown Structure

Procedures

The table below outlines a sample Work Breakdown Structure (WBS) for processing requirements.

Item	Procedures
	The following is a sample of an overall listing of the major headings for a work breakdown structure (WBS) for processing requirements:
1.0	Requirements - Objectives and requirements - approved - Initial development - signed off - Preliminary user's manual - user approved
2.0	Phase 1 Review - Approval to proceed with the design phase
3.0	Product Design - Product design - reviewed - Component specifications - approved - System/acceptance test plans - reviewed
4.0	Component Design - Module designs - reviewed - Component test plan -reviewed - Updated development plan - approved
5.0	Phase 2 Review - Approval to proceed with implementation
6.0	Implementation - All code inspected - All modules complete unit test - Updated development plan - All test cases inspected - All manuals reviewed
7.0	Phase 3 Review - Product pricing approval - Support plan approval - Approval to complete development

continued on next page ...

Atch 4.1.3-1(a), Continued
Work Breakdown Structure

Procedures (Cont'd)

Item	Procedures
8.0	Test - Modules, components, and system tested - Product objectives verified - Updated development plan
9.0	Phase 4 Review - Approval to ship to customer(s) - Approval to implement support plan
10.0	Release - Product shipped to customer
11.0	Acceptance - Completion of acceptance test - Customer acceptance of product
12.0	Phase 5 Review - Post mortem review of development - Updated support plans - Product enhancement plans Note: The subordinate bullet(s) beneath each item represents the item results.

continued on next page ...

Atch 4.1.3-1(a), Continued
Work Breakdown Structure

Procedures The table below outlines a sample Work Breakdown Structure (WBS) for estimating program cost.

Item	Procedures
	The following is a sample of a more detailed portion of a work breakdown structure for estimating program cost:
1.0	Total Program Costs
1.1	- System Engineering/Program Management
1.1.1	-- Military Pay
1.1.2	-- Civilian Pay
1.1.3	-- SETA Support
1.2	- Software Development
1.2.1	-- Commercial Off The Shelf Tools (COTS)
1.2.2	-- Developed Software
1.3	- Hardware Development
1.3.1	-- COTS Hardware
1.3.2	-- Developed Hardware
	Note: This sample can be expanded or items can be deleted to suit each program. The idea is to allocate development costs to the lowest logical level.

Atch 4.2.1-1
Identify Resources

Procedures

The table below outlines procedures to be followed while performing the responsibilities of a project manager.

√	**Develop Project Managers Procedures**
	• A project manager 's role with total business responsibilities for a project is fulfilled through: - Directing, - Controlling, - Administering and, - Regulating the entire project.
	• The following outlines the responsibilities for all software activities for a project to be performed by the project manager: - Follows a written organizational policy for managing the software project, - A documented software development plan is used and maintained as the basis for tracking the software projects, - Kept informed on the software project's status and issues, - Corrective actions are taken when the software plan is not being achieved, either by adjusting performance or by adjusting the plans, - Changes to the software commitments are made with the involvement and agreement of the affected group and, - Explicitly assigns responsibility for software work products and activities. Note: The project manager is the individual ultimately responsible to the customer.

Reference

The Software Engineering Institute (SEI) Capability Maturity Model Version 1.1 February 1993.

Atch 4.2.1-2
Develop High-Level Schedule

Purpose

Good scheduling procedures include predicting the amount of time and personnel required to complete each subphase of a project. High-level scheduling is used to estimate the major milestones and manpower requirements for a given project based on the size, estimated effort, and available personnel. The schedule and manpower estimates should be updated, at a minimum, during each subphase of development.

The effort required to complete a given software development or modification project is divided among the various subphases of the project. Subphase effort distribution factors are used to allocate the effort to each of the subphases to determine the high-level schedule.

Each development activity must determine its own subphase distribution factors based on the unique situation of the particular development effort. The actual factor used will depend on a number of factors including size of the effort, user involvement, quality of requirements documents, experience level of programming staff, etc.

Procedures

Two steps are required to develop a high level schedule:
a) Subphase Effort Distribution
b) Manpower and High Level Scheduling

a. Subphase Effort Distribution.

Step	Description
1	Determine Subphase Effort Distribution Factors. Using historical information and available expertise, estimate the percentage of the overall effort that falls into each of the software development subphases.
2	Determine Subphase Effort Distribution. For each Program Unit, multiply the Subphase Effort Distribution factor for each subphase by the estimated effort for the unit.
3	Total Results. Add the results for each subphase.

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Atch 4.2.1-2, Continued
Develop High-Level Schedule

Procedures (Cont'd)

b. Manpower and High-Level Scheduling.

Step	Description
4	Estimate Subphase Manpower Requirements. Using manpower ramp-up analysis, historical information and available expertise, estimate the manpower required to complete each subphase based on the effort. Manpower requirements depend on a number of factors including availability, level of experience, skill level, etc. Although there is no specific formula for determining the optimal manpower level, drawing the ramp-up curve for the project is especially helpful in determining the effect of manpower on the schedule. Experiment with several different manpower levels to find a curve that provides a realistic schedule based on a reasonable manpower level. (Note: although manpower ramp-up analysis shows manpower increases at the start of the subphase, in reality additional personnel should be trained and brought in gradually as part of the build-up to the next development subphase.)
5	Determine the Estimated High-Level Schedule. Divide the effort estimate for each subphase by the manpower estimate to determine the length of time required to complete the subphase. Total the result of each subphase to determine the overall high-level schedule for the project.

Atch 4.2.1-3
Develop Detailed Schedule

Overview

There are three activities required to complete a detailed schedule:

1. Develop a dependency graph or PERT chart.
2. Perform a workload analysis on the graph using either (pick one)
   a. "Forward Pass" analysis
   b. "Backward Pass" analysis
3. Schedule program units.

Develop Dependency Graph

In order to compute a dependency graph the following steps should be accomplished.

Step	Description
1	Determine Program Unit Interdependencies. For each subphase of a project, examine each program unit as it relates to other program units, modules, subsystems, etc., to determine interdependencies. For example, if work on program unit "x" cannot start until program unit "y" is finished, "x" is dependent on "y."
2	Build Dependency Graph. Build a dependency graph for each subphase of the project showing the interdependencies identified in Step 1. Use lines to connect each activity node in the graph.

"Forward Pass" Analysis

A "Forward Pass" analysis of a dependency graph is accomplished by completing the following steps:

Step	Description
3	Determine Personnel Loading (PL). For each activity node on the dependency graph, estimate the number of people that will be assigned to that activity. Annotate the result above the activity node on the dependency graph. Bear in mind that the total number of personnel assigned to each subphase of the project was estimated in the previous section.
4	Attach the Estimated Effort (EE). Annotate the estimated effort required for each activity node on the dependency graph.

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Atch 4.2.1-3, Continued
Develop Detailed Schedule

"Forward Pass" Analysis (Cont'd)

Step	Description
5	Calculate the Duration (D) of each Node. For each activity node, divide the estimated effort (EE) by the number of personnel assigned to the activity. Annotate the result on the dependency graph.
6	Calculate Early Start and Early Finish Times. Begin at the "start" node in the dependency graph and work toward the "end" node following each path through the graph. The earliest start time for a given activity node is equal to the earliest finish time of the previous node. Add the duration (D) of the activity to the earliest start time to calculate the earliest finish time for the activity. Annotate the results on the dependency graph. Note that the earliest start/finish time of the "start" node is equal to the ending time of the previous subphase dependency graph, or zero in the case of the definition subphase. The earliest start/finish time of the "end" node is equal to the greatest early finish time of all paths.

"Backward Pass" Analysis

A "Backward Pass" analysis of a dependency graph is accomplished by completing the following steps:

Step	Description
7	Calculate late start and late finish times. Begin at the "end" node in the dependency graph and work toward the "start" node following each path in the graph. The latest finish time for a given activity node is equal to the latest start time of its succeeding node. Subtract the duration (D) of the activity from the latest finish time to calculate the latest start time for the activity. Annotate the results on the dependency graph.
8	Calculate slack time. Calculate the slack time for each activity node, by subtracting the earliest start time from the latest start time. Annotate the results on the dependency graph.
9	Identify the critical path(s). The path(s) in which all activity nodes have a slack time of zero is(are) the critical path(s).

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Atch 4.2.1-3, Continued
Develop Detailed Schedule

Schedule Program Units

To schedule individual program units, complete the following steps.

Step	Description
10	Determine scheduled start times. For each subphase of the project, examine the completed dependency graphs and schedule the start date for each program unit in the subphase. Normally, the scheduled start time will be the earliest start time.
11	Determine scheduled finish times. For each subphase of the project, examine the completed dependency graphs and schedule the finish date for each program unit in the subphase.

Important Notes
System Implementation - It is imperative that tasks for site communication layouts, site preparation (electrical, cooling, and construction), and facility security certification/accreditation be included in the detailed schedule. - As a general rule, these tasks should be started a year or earlier before the system will be implemented.

5.0

The Development Phase

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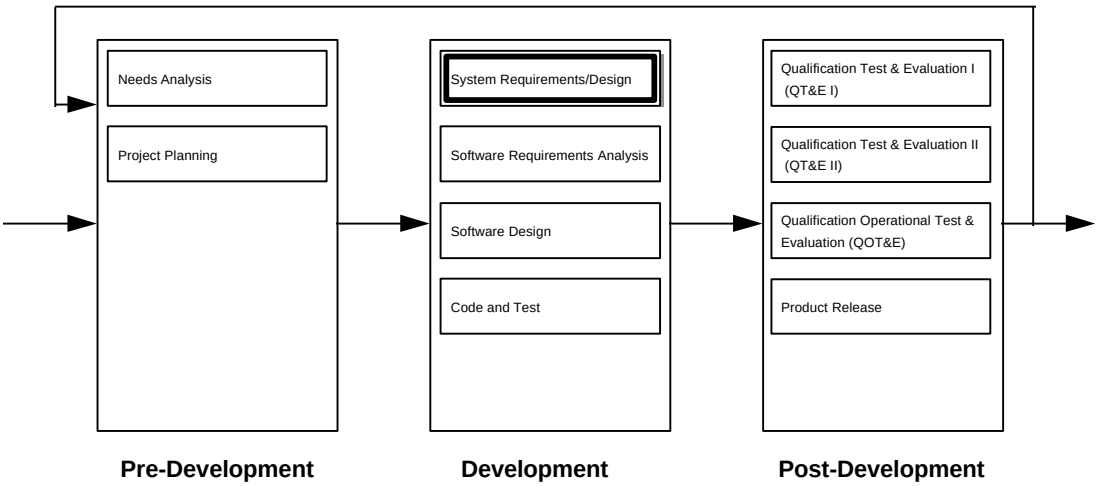
5.1 System Requirements/Design: Overview

Definition

System Requirement : *"A condition or capability needed by a user to solve a problem or achieve an objective."* ANSI/IEEE Std 729-1983

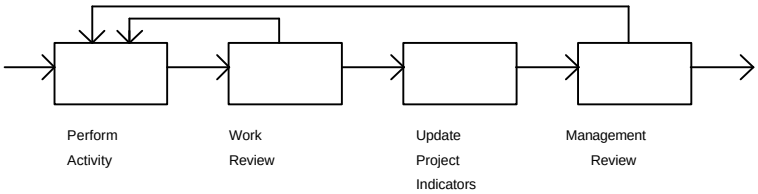
Where We Are

This diagram illustrates where the System Requirement process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete the System Requirement process.



In This Section

The specific System Requirement stages will be covered in the following sections.

Stages	Section
Perform Activity	5.1.1
Work Review	5.1.2
Update Project Indicators	5.1.3
Management Review	5.1.4

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5.1.1 System Requirements/Design: Perform Activity

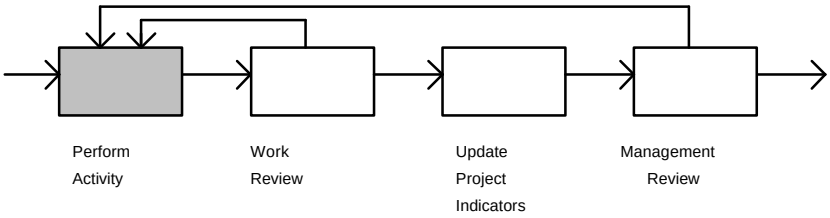
Purpose

The purpose of this stage is to:

1. Further define the user's system requirements.
2. Identify any constraints.
3. Analyze the requirements.
4. Categorize the requirements.
5. Formally document the requirements.
6. Develop the Functional Baseline.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Approved Project Plans	To include as a minimum: - Software Development Plan - Software Configuration Management Plan - Program Management Plan - Communications-Computer System Requirements Document/Operational Requirements Document - Software Support Plan - Integrated Logistics Support Plan - Test and Evaluation Master Plan - Computer Resources Life Cycle Management Plan - Operational Concept Document

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Preparation	Obtain training on requirements analysis. Identify and plan customer involvement. Coordinate activities with SSC support offices.	Atch 5.1.1-1 (Page 5-226) Appendix E
Identify/Elicit User Requirements	Review existing documentation/software. Analyze problem domain analysis Conduct customer Interview. Conduct user surveys. Identify and evaluate reusable system requirements.	Atch 5.1.1-1 Appendix F
Analyze System Requirements	Specify the requirements for the system or a segment of the system. Establish Interface Control Working Group. Update Risk Analysis Document Update Software Development Plan Update Test and Evaluation Master Plan Perform logistics support analysis - Update the CRLCMP and ILSP Research standard data elements and data standardization Complete Interface Requirements Agreement Develop System/Segment Design Document Develop System/Segment Specification Develop Requirements Traceability Matrix Draft the following: - Security Documents - Interface Requirement Specifications - Software Requirements Specifications	Atch 5.1.1-1 DoDD 5000.2M, Part 7 Appendix K Appendix C (See below list for procedures/ format to the adjacent list of plans and documents).
Formally Document User's System Requirements	Requirements Traceability Matrix System/Segment Specifications Test and Evaluation Master Plan Interface Requirement Agreement System/Segment Design Document Draft Security Documents Draft Interface Requirement Specifications Draft Software Requirements Specifications	Atch 5.1.1-1 (Page 5-226) MIL-STD-SDD DoDD 5000.2M, Part 7 Atch 5.1.1-1 (Page 5-226) MIL-STD-SDD Atch 5.2.4-3 (Page 5-cclvii) MIL-STD-SDD MIL-STD-SDD

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Responsible for documenting the system requirements and coordinating with the user and support offices to ensure the requirement is complete, consistent, and actually reflects the user's intention.
Support Offices	Provide support to the project offices as needed (see Appendix E).
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced or updated in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Interface Requirement Agreement (IRA)	Agreement between program managers on external interface requirement.
System/Segment Specifications (SSS)	Description of the required system characteristics that are conditions for system acceptance. This document is used as the basis for developing and testing the system or segment.
Requirement Traceability Matrix (RTM) (draft)	Matrix that allows software features to be traced back to user requirements.
Test and Evaluation Master Plan (TEMP) (draft)	The primary document used to assess adequacy of planned DT&E. It contains a mission and/or system description, the required operational/technical characteristics, critical technical/operational issues, test management responsibilities, DT&E and OT&E outlines including objectives, and a test resource summary.
Security Document (draft)	Documents applicable security issues.
Segment Design Document (SSDD)	Description of the system/segment design used as the basis for developing requirement specifications for HWCIs, CSCIs and interfaces.
Software Development Plan (SDP) (draft)	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.

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Product Summary (Cont'd)

Product	Description
Software Requirements Specification (SRS) (draft)	The SRS specifies the engineering and qualification requirements for a Computer Software Configuration Item (CSCI).
Computer Resources Life Cycle Management Plan (CRLCMP)	The CRLCMP is the primary planning document for computer resources throughout the system life cycle.
Integrated Logistics Support Plan (ILSP)	Identifies logistics support such as maintenance needs, supply (spare parts and consumables, manpower, training, etc.), that must be addressed within the scoped operational needs.
Updated Risk Analysis Document	An interactive process providing information on aspects of a system that need protecting, threats with an impact on the system, how well the system can be protected against those threats, how to improve system security and at what cost, and what residual risk would remain.

Measurement

The following is a minimum set of measurements to collect.

Type	Measurement
Requirement	- Number of requirements to be addressed by the s/w portion of the project - type of requirement (i.e. input, output) - associated risks (i.e. critical, noncritical) - Number of risk management activities associated with the requirement
Schedule	- Number of risk management activities associated with the project planning - estimated schedules and elapsed time in weeks, months, and/or years - milestones or events - Percent of schedule elapsed - hours expended categorized by: - Number of manning positions authorized and assigned to include terms and temporary hire -- Project Office -- Support Offices -- S/W Process Assurance

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Measurement (Cont'd)

Type	Measurement
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) - Current estimate of function points
Cost	- initial estimate of cost in labor months, labor hours, and/or dollars - budgets in labor months, labor hours, and/or dollars - amount spent in labor months, labor hours, and/or dollars - Percent of budget spent to date (labor months, labor hours, and dollars)

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Software System/Specifications (SSS) and Interface Requirements Agreement (IRA) have been completed.
	Project risks have been identified, documented, and their impact assessed.

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5.1.2 System Requirements/Design Work Review

Purpose

The purpose of this review is to ensure that:

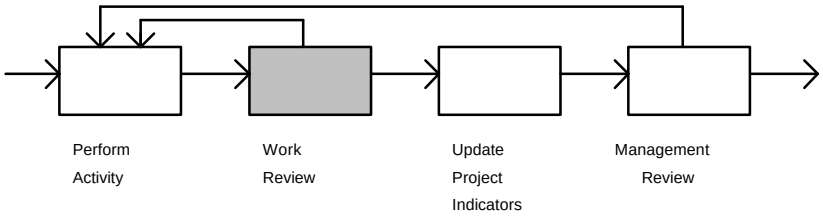
1. 1. Appropriate support and system organizations have been identified and given the opportunity to assess the technical content of the system requirements.

   2. System requirements are reviewed for technical content: - documented in accordance with SSC policies, procedures, and standards - stated in terms that are complete, consistent, feasible, testable, and reusable.
3.
3. 3. System requirements are traceable to the original user's requirements document (e.g. ORD, CSRD).

   4. Technical risks are identified and documented.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
System requirements documents	User requirements developed in previous stages to include: SDP, SSS, IRA, TEMP, RTM, Security Document, and Risk Analysis Document.
Review Questionnaire and/or Checklist	Any questionnaire or checklist tools developed to assist the review process.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Develop and Distribute review package.	Appendix A (Page A-10)
Conduct the Review	Review draft documents IAW the SSC Work Review Procedures. Material to review include: - System Segment Specifications. - System/Segment Design Document. - Interface Requirements Agreement. - Requirements Traceability Matrix. - Status of the draft documents: -- Updated Software Development Plan (SDP) Ensure the above documents are: - acceptable by the system OPR(s). - documented in accordance with policies and standards. - complete, consistent, unambiguous, feasible and testable. - traceable to the CSRD, ORD and OCD.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project Risks. - Product defects. - Review action items. - Review minutes. - Review Panel recommendation.	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Presents System Requirements document for review.
System OPR	Represents system viewpoint.
Review Panel	Reviews material.
Support OCRs	Support review panel, as needed, on specific items.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
System Requirement Documents	User Requirements developed in previous stages to include: updated SDP, SSS, IRA, updated RTM, TEMP, and Security Document.
Risk Assessment	Risks identified during the review.
Defect Report	Defects identified during the review.
Action Items	Action Items taken during the review.
Minutes	Minutes of the review.
Recommendation(s)	Review panel's recommendation on technical suitability of material presented and recommendation to proceed.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * -Number of risk management activities associated with the development activity - defects, errors, omissions found during review
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed - hours expended categorized by: * - Number of manning positions authorized and assigned to include terms and temporary hire -- Project office prep -- Support offices prep -- Conduct of review

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Measurement (Cont'd)

Type	Measurement
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate of function points.
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars * - Percent of budget spent to date (labor months, labor hours, and dollars) *revise from sec 5.1.1

Exit Criteria

The system requirement documents have been technically reviewed.

IF Review Panel ...	THEN ...
Approves technical content	Project proceeds to Update Management Indicators Stage.
Disapproves technical content	The system requirement documents are recycled to the System Requirement Perform Activity Stage for further refinement.

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5.1.3 System Requirements/Design: Update Project Indicators

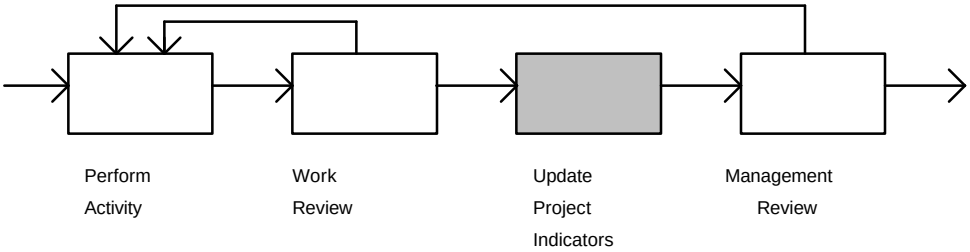
Purpose

The purpose of this process is to:

1. Update project management indicators - Size, Cost, and Schedule.
2. Evaluate project risk and assess impact.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	System requirements and related documents have been technically reviewed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
System requirement documents	User Requirements to include SDP, SSS, IRA, RTM, TEMP, and Security Document.
Estimation procedures	Current approved SSC estimation procedures.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-48)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Perform activities associated with this process.
Support Offices	Provide support as requested by Project Office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and /or procedures.

Product	Description
Size Estimate	Revised size estimate.
Cost Estimate	Revised cost estimate.
Schedule Estimate	Revised schedule estimate.
Risk Analysis Report	Revised Risk Analysis.

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* -Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * -Number of risk management activities associated with the requirement analysis activity
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed - hours expended categorized by: * - Number of manning positions authorized and assigned to include terms and temporary hire -- Project office -- Support offices
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate of function points
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars * - Percent of budget spent to date (labor months, labor hours, and dollars) *revise from sec 5.1.2

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.
	Project risks have been re-evaluated and their impact assessed.

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5.1.4 System Requirements/Design: Management Review (System Design Review) (Milestone II, DoDD 5000.1)

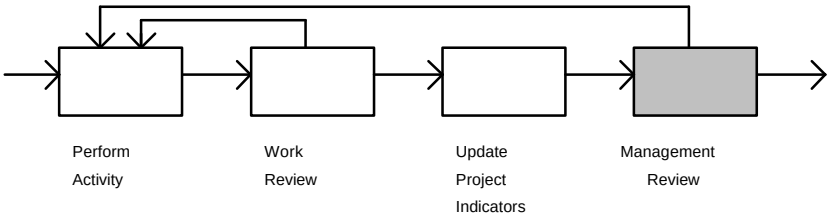
Purpose

The purpose of this review is to:

1. Provide management visibility.
2. Approve/disapprove the system requirements document (i.e., SSS).
3. Review revised project size, cost, and schedule estimate.
4. Review project risk areas.
5. Approve/disapprove continuation of the project.
6. Approve and allocate resources and funding to accomplish the next phase.
7. Establish the Functional Baseline.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Functional requirements have been defined, analyzed, reviewed, and documented
	Project size, cost, and schedule estimates have been revised based on the system requirements.
	Project risks have been analyzed and their impact assessed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software requirements documents	User requirements to include: SDP, SSS, IRA, RTM, TEMP, and security document.
Project Plans	All plans associated with the project.
Revised Project Management Estimates	Size, Cost, and Schedule estimates.
Project Risks	Revised Risk Analysis Report.
Work Review results.	Minutes, action items and recommendations from the Work Review.
Review Questionnaire/Checklist	Any questionnaire or checklist tools developed to assist the review process.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedure
Review Preparation	Review requirements for conducting a Systems Requirements Review Develop and distribute review package.	Appendix A (Page A-10)
Conduct the Review	Review documents IAW the SSC Management Review Procedures. Material to review include: - Overview of the system requirements. - Overview of Work Review (Action Items, Recommendation). - Draft Risk Analysis Report. - Revised estimates (Size, Cost, Schedule). - Status of effort expended to date. - Funding Requirements. - Resource Impact and Cost. - Plans to accomplish near-term actions. - SSC manpower requirements; Direct, Support, Overhead, and System. Decisions to make: - Baseline the SSS and IRA documents - Approve/disapprove continuation of the project.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project risks. - Product defects. - Review action items. - Review minutes. - Approval/disapproval decision. Provide system baseline to the Defense Software Reuse System.	Appendix A (Page A-15) Appendix F

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove.
Project Office	Presents review material to management.
Review Panel	Assist management in the decision process.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal and formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
System Segment Specifications Document	Description of the required system characteristics that are conditions for system accptance. This document is used as the basis for developing and testing the system or segment. It becomes a functional baseline.	F
Risk Analysis Document	Management risks identified during the review.	I
System/Segment Design Document	Description of the system/segment design used as the basis for developing requirement specifications for HWCIs, CSCIs and interfaces.	F
Interface Requirement Agreement (IRA)	Agreement between program managers on external interface requirement.	F
Approved, updated SDP	Revised project estimates (size, cost, and schedule).	I
Management review defect report	Defects identified during the review.	I
Management review action items	Action items taken during the review.	I
Management review minutes	Minutes of the review.	I
Approval authority's continuation decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	I

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity - Number of Engineering Change Proposals (ECPs) - Number of action items assigned by the Approval Authority
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed - hours expended categorized by: * - Number of manning positions authorized and assigned to include terms and temporary hire -- Project office prep -- Support offices prep -- Conduct of review -- Total hours expended
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate of function points
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars * - Percent of budget spent to date (labor months, labor hours, and dollars) *revise from sec 5.1.3

Exit Criteria

Management has committed to allocate resources to implement the requirement. The system requirements are baselined. Otherwise, the system requirement are recycled through the System Requirement Perform Activity stage or the project is canceled.

IF Approval Authority ...	THEN ...
Approves Continuation	Project proceeds to initiate the Software Requirements process.
Disapproves Continuation	The system requirements document and associated material are recycled to the System Requirements Perform Activity stage for further refinement.
Cancels Project	Refer to Cancellation process (see Appendix H).

5.2 Software Requirements: Overview

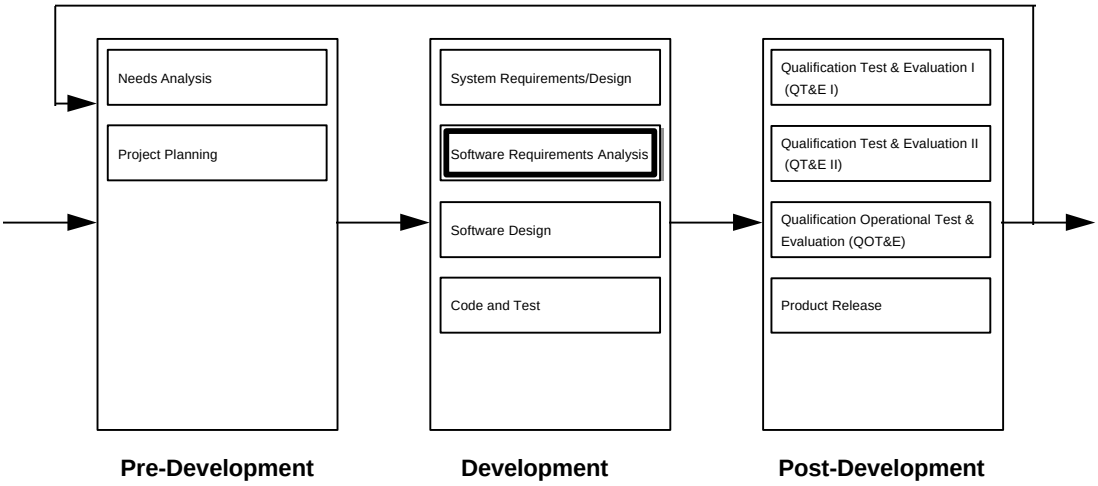
Definition

Software Requirement : *"A condition or capability that must be met or possessed by a system or a system component to satisfy a contract, standard, specification, or other formally imposed document. The set of all requirements forms the basis for subsequent development of the system or system component."*

ANSI/IEEE Std729-1983

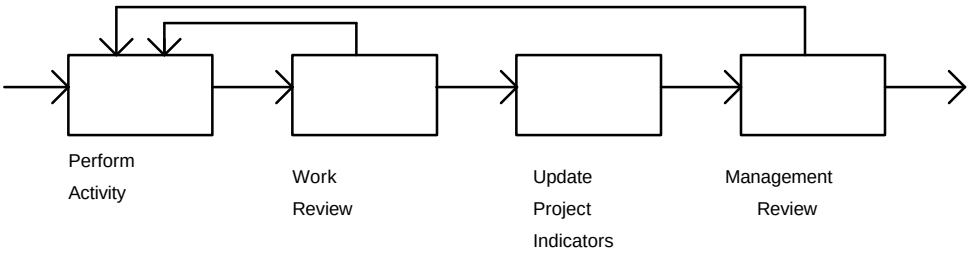
Where We Are

This diagram illustrates where the Software Requirements process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete the Software Requirement process.



In This Section The specific Software Requirement stages will be covered in the following sections.

Software Requirements Stage	Section
Perform Activity	5.2.1
Work Review	5.2.2
Update Project Indicators	5.2.3
Management Review	5.2.4

5.2.1 Software Requirements: Perform Activity

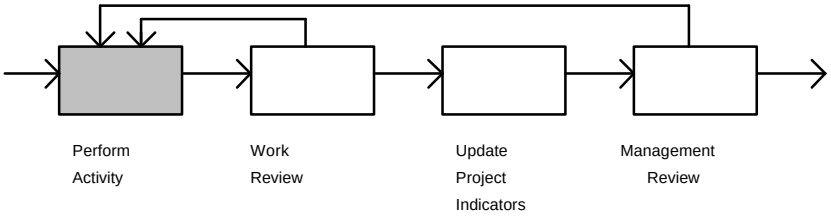
Purpose

The purpose of this stage is to translate the user's requirements into a software specification that describes what functions the software/system is to perform.

The software requirements cover the software functions and performance, the interfaces to both hardware and software, and the human-computer interface.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Approved system requirements documents	User requirements developed and approved during the system requirements process to include: - System Segment Specifications. - System/Segment Design Document. - Interface Requirement Agreement. -Test and Evaluation Master Plan. - Updated Risk Analysis Document. - Security Requirements. - Updated Software Development Plan
Requirements Traceability Matrix	Matrix allowing software features to be traced back to system requirement.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Preparation	Obtain training in software requirements methodology. Identify and plan customer involvement. Identify and evaluate reuse software. Coordinate activities with SSC Support Office.	Atch 5.2.1-1 (Page 5-239) Appendix F Appendix E
Define and develop software requirements	Review system requirements. Develop prototypes as required. Reuse the available software requirements. Complete Software Requirements Specifications. Complete Interface Requirements Specifications. Update Test and Evaluation Master Plan Update Software Development Plan Update Requirements Traceability Matrix.	Atch 5.2.1-1 Appendix F (See below list for procedures/ format to the adjacent list of documents). Atch 5.1.1-1 (Page 5-226)
Formally document software requirements	Software Requirements Specifications (SRS) Interface Requirements Specifications (IRS)	MIL-STD-SDD MIL-STD-SDD
Establish requirements validation criteria	Identify and document method for verifying each software requirement: Draft Software Test Plans Draft Software Test Descriptions Test and Evaluation Master Plan	 MIL-STD-SDD MIL-STD-SDD DoDD 5000.2M, Part 7
Update system requirements	Submit a Baseline Change Request (BCR) to Update the Software/System Specifications Document as necessary.	Appendix G

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Responsible for documenting the software requirements and coordinating with the user and support offices to ensure the requirement is complete, consistent, and actually reflects the users intention.
Support offices	Provide support to the project offices as needed (see Appendix E for a detailed list).
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Software Requirement Specifications (SRS)	Specifies the engineering and qualification requirements for a Computer Software Configuration Item (CSCI), used as the basis for developing and testing a CSCI and becomes part of the Allocated Baseline.
Requirement Traceability Matrix (RTM)	Matrix allowing software features to be traced back to system requirement.
Interface Requirement Specifications (IRS)	Specifies the requirements for one or more interfaces between one or more CSCIs and other configuration items or critical items.
Test and Evaluation Master Plan (TEMP) (draft)	The primary document used to assess adequacy of planned DT&E. It contains a mission and/or system description, the required operational/technical characteristics, critical technical/operational issues, test management responsibilities, DT&E and OT&E outlines including objectives, and a test resource summary.
Security Requirements	Documents applicable security issues.
Software Development Plan (SDP)	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.

Measurement
.

This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* - Number of requirements to be addressed by the s/w portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of ECPs - Percent/Number of action items open/closed to date - required transaction time - required response time - required availability
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed - elapsed development time - hours expended categorized by: * - Number of manning positions authorized and assigned to include terms and temporary hire -- Project office -- Support offices -- Software Process Assurance -- Total hours
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate in function points
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) *revise from sec 5.1.4

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	**Exit Criteria**
	The Software Requirements Specifications and Interface Requirements Specifications have been completed.
	The Software Test Plan , Software Test Description and test cases are documented.
	Project risks have been identified, documented, and their impact assessed.

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5.2.2 Software Requirements Work Review

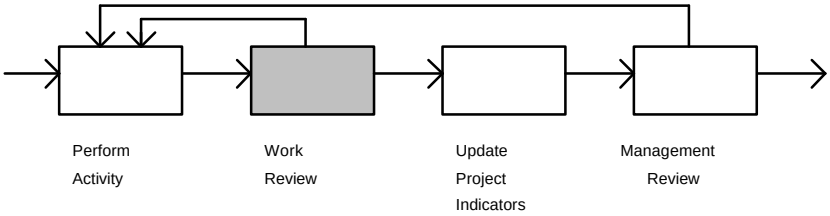
Purpose

The purpose of this review is to ensure that:

1. Appropriate support and system organizations have been identified and given the opportunity to assess the technical content of the software requirements.
2. Software requirements are reviewed for technical content:
   - documented in accordance with SSC policies, procedures, and standards.
   - stated in terms that are complete, consistent, feasible, testable, and reusable.
3. Software requirements are traceable to the original user's need statement and the approved system requirements.
4. Technical risks are identified and documented.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software Requirement Documents	Software requirements documents developed in the previous stages to include: SRS, IRS, RTM, SDP and Security Document, and Risk Analysis Document.
Review Questionnaire and/or Checklist	Any questionnaire or checklist tools developed to assist the review stage.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Develop and distribute review package.	Appendix A (Page A-10)
Conduct the Review	Reveiw draft documents IAW the SSC Work Review Procedures. Materials to review include: - Software Requirement Specification. - Interface Requirements Specification. - Requirement Traceability Matrix. - Status of the draft documents: -- Updated Software Development Plan (SDP) Ensure software requirements are: - documented in accordance with policy and standards. - complete, consistent, unambiguous, feasible, testable and reusable. - traceable to the system requirements. - Identify project risks.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project Risks - Product defects - Review action items - Review minutes - Review Panel recommendation	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Presents Software Requirements and associated documents for review.
System OPR	Represents system viewpoint in review.
Review Panel	Reviews material.
Support OCR's	Support review panel, as needed, on specific items.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Software Requirements Document	Software requirements documents developed in the previous stages to include: SRS, IRS, updated RTM, TEMP, updated SDP, and security document.
Risk Analysis Document	Risks identified during the review.
Defect Report	Defects identified during the review.
Action Items	Action Items taken during the review.
Minutes	Minutes of the review.
Recommendation(s)	Review panel recommendation on technical suitability of material presented.

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of ECPs - defects, errors, omissions found during review
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: * - Number of manning positions authorized and assigned to include terms and temporary hire -- Project office prep -- Support offices prep -- Conduct of review
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate of function points
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) *revise from sec 5.2.1

Exit Criteria

The software requirement documents have been technically reviewed.

IF Review Panel ...	THEN ...
Approves Technical Content	Project proceeds to the Update Management Indicators stage.
Disapproves Technical Content	The software requirements document and associated material are recycled to the Software Requirements Perform stage for further refinement.

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5.2.3 Software Requirements: Update Project Indicators

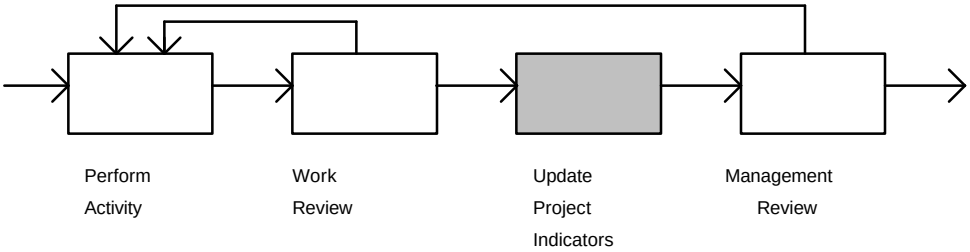
Purpose

The purpose of this stage is to:

1. Update project management indicators - Size, Cost, and Schedule.
2. Evaluate project risk and assess impact.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	All software requirements have been technically reviewed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software Requirement Documents	Defines the software requirements to be implemented to include: SRS, IRS, RTM and SDP.
Estimation Procedures	Current approved SSC estimation procedures.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-48)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Perform activities associated with this stage.
Support Offices	Provide support as requested by Project Office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Size estimate	Revised size estimates.
Cost estimate	Revised cost estimates.
Schedule estimate	Revised schedule estimates.
Risk analysis report	Revised risk analysis report.

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of ECPs
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: * - Number of manning positions authorized and assigned to include terms and temporary hire -- Project office -- Support offices
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate of function points
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) *revise from sec 5.2.2

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.
	Project risks have been re-evaluated and their impact assessed.

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5.2.4 Software Requirements: Management Review (Software Specification Review) (Milestone III, DoDD 5000.1)

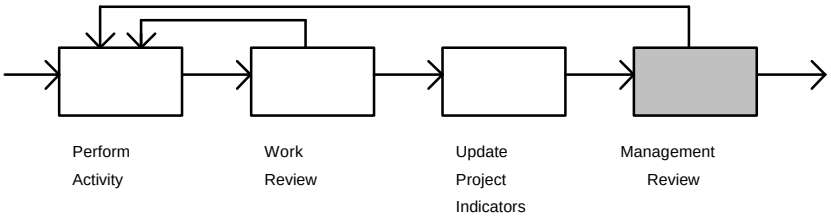
Purpose

The purpose of this review is to:

1. Provide management visibility.
2. Approve/disapprove the software requirements document.
3. Review initial project size, cost, and schedule estimate.
4. Review project risk areas.
5. Approve/disapprove continuation of the project.
6. Approve and allocate resources and funding to accomplish the next phase.
7. Establish the Allocated Baseline.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Project size, cost, and schedule estimates have been revised based on the software requirements.
	Project risks have been analyzed and their impact assessed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software Requirements Documents	Completed SRS and IRS; updated RTM and SDP.
Project Plans	All plans associated with the project.
Revised Project Management Estimates	Size, cost, and schedule.
Project Risks	Revised Risk Analysis.
Work Review results	Minutes, action items and recommendations from the Work Review.
Review Questionnaire/ Checklist	Any questionnaire or checklist tools developed to assist the review process.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Review requirements for conducting a Software Specifications Review Develop and distribute review package	Appendix A (Page A-10)
Conduct the Review	Review documents IAW the SSC Management Review Procedures. Materials to review include: - Overview of the Software Requirements. - Overview of Work Review (Action Items, Recommendations, etc.). - Risk Analysis Report. - Revised estimates (size, cost, schedule). - Status of effort expended to date. - Funding requirements. - Resource impact and cost. - Plans to accomplish near-term actions. - SSC manpower requirements; Direct, Support, Overhead, System. Identify project risks. Decisions to make: - baseline the SRS and IRS - approve/disapprove continuation of the project.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project Risks. - Product defects. - Review action items. - Review minutes. - Approval/disapproval decision. - Provide Allocated Baseline to the Defense Software Repository System (DSRS).	Appendix A (Page A-15) Appendix F

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove.
Project Office	Presents review material to management.
Review Panel	Assist Management in the decision process.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I ' or 'F ' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Software Requirements Specifications (SRS)	Specifies the engineering and qualification requirements for a Computer Software Configuration Item (CSCI), used as the basis for developing and testing a CSCI and becomes part of the Allocated Baseline.	F
Interface Requirement Specifications (IRS)	Specifies the requirements for one or more interfaces between one or more CSCIs and other configuration items or critical items.	F
Approved updated SDP	Revised project estimates (size, cost, and schedule).	I
Risk Analysis Document	Management risks identified during the review.	I
Management reviewed defect report	Defects identified during the review.	I
Management reviewed action items	Action items taken during the review.	I
Management reviewed minutes	Minutes of the review.	I
Approval authority's continuation decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	I

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of ECPs - Number of action items assigned by the Approval Authority
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: * - Number of manning positions authorized and assigned to include terms and temporary hire -- Project office prep -- Support offices prep -- Conduct of review -- Total hour expended
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate in function points
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) *revise from sec 5.2.3

Exit Criteria

Management commit to allocation resources to implement the software requirements. The software requirements are baselined. Otherwise, the software requirement are recycled through the Software Requirement Perform Activity stage or the project is canceled.

IF Approval Authority ...	THEN ...
Approves Continuation	The project proceeds to the Software Design Phase.
Disapproves Continuation	The software requirements and associated material are recycled to the Software Requirements Perform Activity stage for further refinement.
Cancels Project	Refer to cancellation process (see Appendix H).

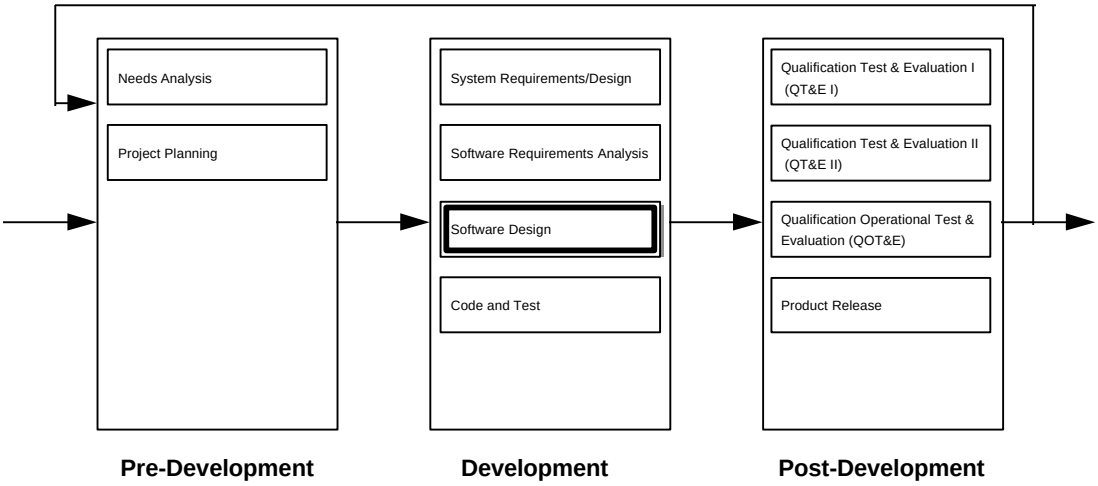
5.3 Software Design : Overview

Definition

<u>Software Design</u> : *"The period of time in the software life cycle during which the designs for architecture, software components, interfaces, and data are created, documented, and verified to satisfy requirements."* ANSI/IEEE Std 729-1983

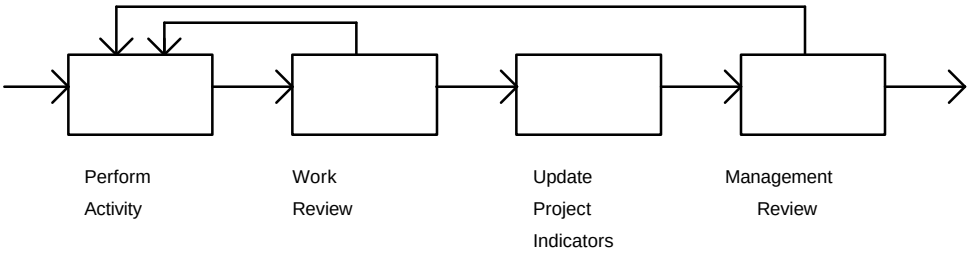
Where We Are

This diagram illustrates where the Software Design process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete this process.



In This Section The specific Software Design stages will be covered in the following sections.

Software Design Stage	Section
Perform Activity	5.3.1
Work Review	5.3.2
Update Project Indicators	5.3.3
Management Review	5.3.4

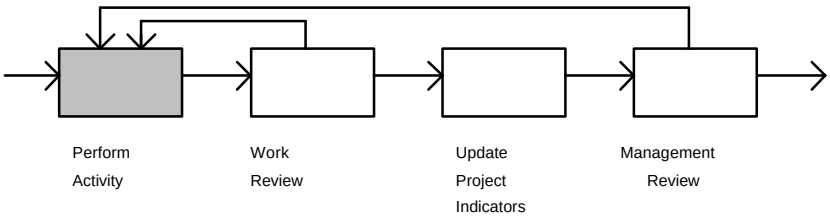
5.3.1 Software Design: Perform Activity

Purpose

The Software Design Documents are created in this stage to plan for the implementation of system requirements through software.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Approved software requirements documents	User requirements to include: - Test and Evaluation Master Plan (TEMP) - Security Document - Software Requirement Specifications (SRS) - Interface Requirement Specifications (IRS) - Software Development Plan (SDP)
Requirements Traceability Matrix (RTM)	Matrix allowing software design features to be traced to software requirement specifications.

Activities

NOTE: This stage varies in scope and complexity, depending on the overall requirements of the system. Consider the following options:

a. Conduct a peer review following architectural or conceptual database design.
b. Create a separate document describing human-computer interfaces
c. Conduct a separate review for each CSCI and interface design.

The following activities are performed during this stage:

Activity	Associated Tasks	See Procedures
Preparation	Obtain training for Design Methodology. Review SSC Standards on Design Analysis.	Atch 5.3.1-1 (Page 5-241)
Design the Software	Review System and Software requirements document. Update Architectural Design Data Base Design: - Conceptual. - Logical. - Physical. Detailed Design (software sub components): - Data Structures. - Algorithms. - Control information. Update Software Development Plan Update Requirements Traceability Matrix Design Interface(s). Develop Design Prototypes. Reuse available software design assets. Periodically review and inspect the design. Coordinate tasks with appropriate working group(s). Use standard data elements Develop the following: - Software Design Document - Interface Design Document - Database Design Document - Computer Center Software Operator Manual (Draft, top level) - Software User Manual (Draft, top level)	Atch 5.3.1-1 MIL-STD-SDD Atch 5.1.1-1 (Page 5-226) Atch 5.3.1-1 Appendix F Atch 5.3.1-1 Appendix C (See the below list for procedures/ format to the adjacent list of documents)

continued on next page...

Activities (Cont'd)

Activity	Associated Tasks	See Procedures
Formally Document the Software Design	Software Design Document Interface Design Document Database Design Document Requirements Traceability Matrix Update draft of all test documentation: - Software Test Plan - Software Test Descriptions/Cases Computer Center Software Operator Manual (CCSOM) (Draft,top level) Software User Manual (SUM) (Draft, top level)	MIL-STD-SDD MIL-STD-SDD MIL-STD-SDD Atch 5.1.1-1 (Page 5-226) MIL-STD-SDD MIL-STD-SDD MIL-STD-SDD MIL-STD-SDD
Coordinate Activities	Contact Appropriate Working Group(s).	Atch 5.3.1-1 (Page 5-241)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Responsible for documenting the software design and coordinating with the user and support offices to ensure the design is complete, consistent, and actually reflects the users intention.
Support Offices	Provide support to the project offices as needed (see Appendix E).
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Software Design Document (SDD)	Software design developed to address system requirements.
Database Design Document (DBDD)	A DBDD describes the logical and physical design of a database and gives information necessary for the construction of the database and for its use by application programmers.
Requirement Traceability Matrix (RTM)	Matrix allowing software features to be traced back to system requirement.
Interface Design Document (IDD)	Technical description of all external interfaces that need to be accommodated.
Software Test Plan, Software Test Description and Test Cases (Draft)	All test documentation associated with the project.
Computer Center Software Operator Manual (CCSOM) (Draft)	Manual describing all software operational requirements.
Software User Manual (SUM) (Draft)	Instructions for software user.
Security Document	Identifies all security risks.
Software Development Plan (SDP)	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirements	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs - Percent/Number of action items open/closed to date - required transaction rate - required response time - required availability - Number of pages of documentation by document name; pages can be classified as text, tables, or figures - Number of documents by type
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office -- Support offices -- Software Process Assurance -- Total hours expended

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Measurement (Cont'd)

Type	Measurement
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate (new, reuse, and total KSLOC or FPs) - Number of design components (screen, object) - Number of design statements, program design language (PDL) statements, and structured narrative statements - Number of pages in design documents - Number of process "bubbles" - Number of data "entities" - Number of boxes or arrows in hierarchical I/O charts - Number of CSCIs, CSC, and CSUs - Number of inputs/outputs - Number of external interfaces - Number of logical files
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from sec 5.2.4

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Completed Software Design Document (SDD), Interface Design Document (IDD), Database Design Document (DBDD)
	Project risks have been identified, documented, and their impact assessed.

5.3.2 Software Design Work Review

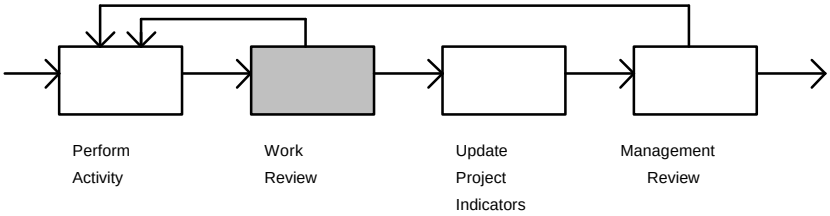
Purpose

The purpose of this review is to ensure that:

1. Appropriate support and system organizations have been identified and given the opportunity to assess the technical content of the software design.
2. Software designs are reviewed for technical content:
   - documented in accordance with SSC policies, procedures, and standards.
   - stated in terms that are complete, consistent, feasible, and testable.
3. The software designs are traceable to the original user's need statement, approved system and software requirements.
4. Technical risks are identified and documented.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software Design Documents	Includes the SDD, IDD, DBDD, updated RTM, SDP and risk analysis document.
Review Questionnaire and/or Checklist	Any questionnaire or checklist tools developed to assist the review process.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Develop and distribute review package.	Appendix A (Page A-10)
Conduct the Review	Review draft documents IAW the SSC Work Review Procedures. Materials to review include: - SDD, IDD, DBDD - Software Test Plans - Verification and validation - Status of the draft documents: -- Updated Software Development Plan (SDP) Ensure software designs are: - documented in accordance with policy and standards. - complete, consistent, unambiguous, feasible and testable. - traceable to the system and software requirements. Ensure the RTM is updated and correct. Identify project risks.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project Risks. - Product defects. - Review action items. - Review minutes. - Review Panel recommendation.	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities in this stage.

Role	Responsibility
Project Office	Presents the software design and associated documents for review.
System OPR	Represents system viewpoint, in review.
Review Panel	Reviews material.
Support OCR's	Support review panel, as needed, on specific items.
Software Process Assurance Group (SPA)	Monitors the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Software Design Document	Software design developed to address software requirement Specifications to include: SDD, DBDD, IDD, and SDP.
Software Test Plan, Software Test Description and Test Cases	All test documentation associated with the project.
Risk Analysis Document	Risks identified during the review.
Defect Report	Defects identified during the review.
Action Items	Action Items taken during the review.
Minutes	Minutes of the review.
Recommendation(s)	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Requirements	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs - Percent/Number of action items open/closed to date - required transaction rate - required response time - required availability - Number of pages of documentation by document name; pages can be classified as text, tables, or figures - Number of documents by type - defects, errors, omissions found during review

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Measurement (Cont't)

Type	Measurement
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office -- Support offices -- Software Process Assurance -- Total hours expended
Size	(Systemity is a determinant of size. At this point, estimate size based on the Number of req'ts) * - Current estimate Function Points * - Number of design components (screen, object) * - Number of design statements, program design language (PDL) statements, and structured narrative statements * - Number of pages in design documents * - Number of process "bubbles" * - Number of data "entities" * - Number of boxes or arrows in hierarchical I/O charts * - Number of CSCIs, CSC, and CSUs * - Number of inputs/outputs * - Number of external interfaces * - Number of logical files
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from sec 5.3.1

Exit Criteria

The software designs have been technically reviewed.

IF Review Panel ...	THEN ...
Approves Technical Content	Project proceeds to the Update Management Indicators stage.
Disapproves Technical Content	The software design and associated documents are recycled to the Software Design Perform stage for further refinement.

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5.3.3 Software Design: Update Project Indicators

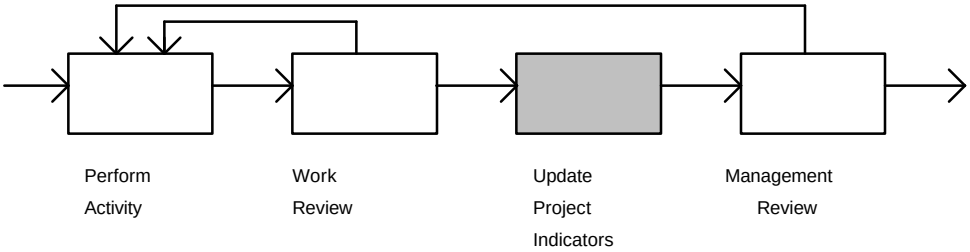
Purpose

The purpose of this process is to:

1. Update project management indicators - Size, Cost, and Schedule.
2. Evaluate project risk and assess impact.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The SDD, IDD, SDP, and DBDD have been reviewed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software Design Documents	Includes the SDD, IDD, DBDD, RTM, SDP.
Estimation Procedures	Current approved SSC estimation procedures.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-48)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities in this stage.

Role	Responsibility
Project Office	Perform activities associated with this stage.
Support Offices	Provide support as requested by Project Office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Size Estimate	Revised Size Estimate
Cost Estimate	Revised Cost Estimate
Schedule Estimate	Revised Schedule Estimate
Risk Analysis Report	Revised Risk Analysis Report

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirements	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs * - Percent/Number of action items open/closed to date * - required transaction rate * - required response time * - required availability * - Number of pages of documentation by document name; pages can be classified as text, tables, or figures * - Number of documents by type
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office -- Support offices
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate in Function Points * - Number of design components (screen, object) * - Number of design statements, program design language (PDL) statements, and structured narrative statements * - Number of pages in design documents * - Number of process "bubbles" * - Number of data "entities" * - Number of boxes or arrows in hierarchical I/O charts * - Number of CSCIs, CSC, and CSUs * - Number of inputs/outputs * - Number of external interfaces * - Number of logical files

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Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from sec 5.3.2

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.
	Project risks have been re-evaluated and their impact assessed.

5.3.4 Software Design: Management Review (Preliminary Design/Critical Design Reviews)

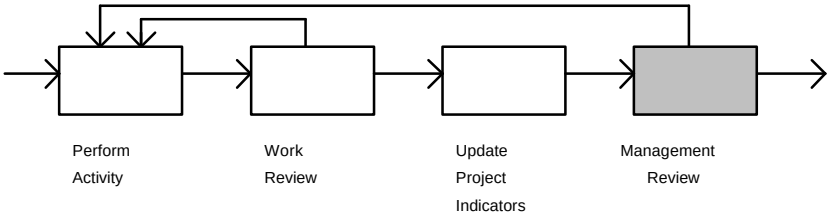
Purpose

The purpose of this review is to:

1. Provide management visibility.
2. Approve/disapprove all software and interface design documents.
3. Review initial project size, cost, and schedule estimate.
4. Review project risk areas.
5. Approve/disapprove continuation of the project.
6. Approve and allocate resources and funding to accomplish the next phase.
7. Establish the provisional baseline for the design.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The SDD, IDD, SDP, and DBDD have been reviewed for technical content.
	Project size, cost, and schedule estimates have been revised based on the software design.
	Project risks have been analyzed and their impact assessed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software Design Documents	Includes: SDD, DBDD, IDD.
Project Plans	All plans associated with the project (i.e. SDP).
Updated Project Estimates	Size, cost, and schedule.
Work Review Minutes	Minutes from the Work Review.
Work Review Action Items	List of all Action Items from the Work Review.
Work Review Recommendation	Recommendation from the Work Review.
Review Questionnaire/ Checklist	Any questionnaire or checklist tools developed to assist the review process.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Develop and distribute review package.	Appendix A (Page A-10)
Conduct the Review	Review documents IAW the SSC Management Review Procedures. Material to review: - Overview of the Software Design. - Overview of Work Review (Action Items, Recommendations). - Revised project estimates. - Status of effort expended to date. - Funding requirements. - Resource Impact and Cost. - Plans to accomplish near-term actions. - SSC manpower requirements; Direct, Support, Overhead, System. Identify project risks. Decisions to make: - baseline software design. - finalize/approve CRLCMP, ILSP, and System Training Plan - approve/disapprove continuation of the project.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project Risks. - Product defects. - Review action items. - Review minutes. - Any changes that need to be made to the baseline must be identified, evaluated, assessed for risk, documented, planned, communicated to the affected groups or individuals and tracked to completion. The changes must be reprocessed through the Needs Analysis phase. - Approval/disapproval decision.	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove.
Project Office	Presents review material to management.
Review Panel	Assist Management in the decision process.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Software Design Documents	SDD, IDD, DBDD, SDP.	F
Approved Updated Project Estimates	Revised size, cost, and schedule estimates.	I
Risk Analysis Document	Management risks identified during the review.	I
Review Defect Report	Defects identified during the review.	I
Review Action Items	Action Items taken during the review.	I
Review Minutes	Minutes of the review.	I
Approval Authority's Continuation Decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	I

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirements	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs - Percent/Number of action items open/closed to date - Number of pages of documentation by document name; pages can be classified as text, tables, or figures
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office prep -- Support offices prep -- Conduct of review -- Total hours
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate in Function Points * - Number of design components (screen, object) * - Number of design statements, program design language (PDL) statements, and structured narrative statements * - Number of pages in design documents * - Number of CSCIs, CSC, and CSUs * - Number of inputs/outputs * - Number of external interfaces * - Number of logical files
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from sec 5.3.3

Exit Criteria

Management has commitment to allocate resources to implement the design. The software designs are baselined. Otherwise, the designs are recycled through the Software Design Perform Activity stage or the project is canceled.

IF Approval Authority ...	THEN ...
Approves Continuation	The project proceeds to the Code and Test process.
Disapproves Continuation	The design and associated material are recycled to the Software Design Perform Activity stage for further refinement.
Cancels Project	Refer to Cancellation process (see Appendix H).

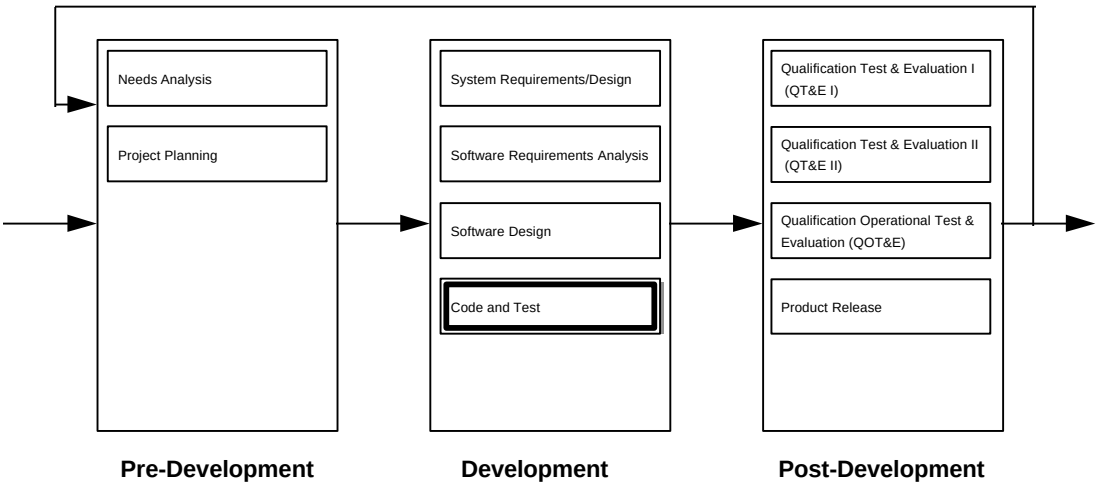
5.4 Code and Test: Overview

Definition

Code and Test is the process where the software design is developed into source code modules, and tested to ensure compliance with the user's system requirements.

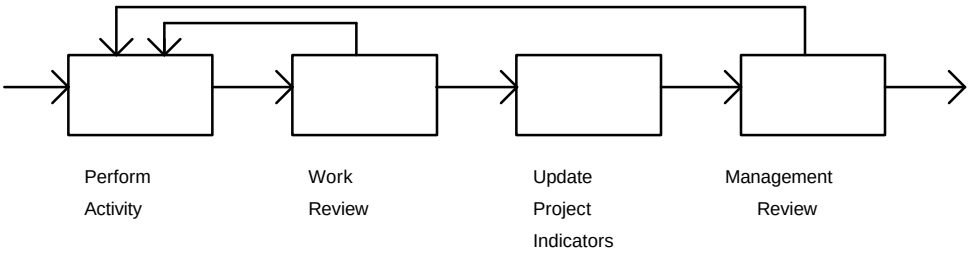
Where We Are

This diagram illustrates where the Code and Test process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete the Code and Test process.



In This Section

The specific Code and Test stages will be covered in the following sections.

Code and Test Stage	Section
Perform Activity	5.4.1
Work Review	5.4.2
Update Project Indicators	5.4.3
Management Review	5.4.4

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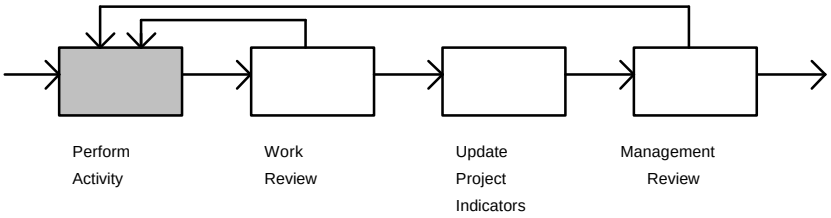
5.4.1 Code and Test: Perform Activity

Purpose

During the perform stage, the software modules are developed and tested.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The software designs have been defined, prioritized, documented, and approved.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Software Design Documents	Software design developed to address software requirements to include: -Software Design Document (SDD) -Interface Design Document (IDD) -Software Development Plan (SDP) -Database Design Document (DBDD) -Software Test Plan (STP) -Software Test Descriptions (STD) -Computer Center Software Operator Manual (CCSOM) -Software User Manual (SUM) -Security Document
Requirements Traceability Matrix (RTM)	Matrix allowing the coded products to be traced back to the Software Design Document

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Preparation	Obtain training in Code and Testing Methodology Prepare publication announcement Identify and evaluate reusable code assets	Atch 5.4.1-1 (Page 5-249) Appendix F
Code the Software	Review Design and Requirements Documents Develop the source code Generate executables Reuse code assets	Atch 5.4.1-1 Appendix F
Test the Software	Perform testing IAW Software Test Plans Reuse test assets	Atch 5.4.1-1 Appendix F
Turn-In Preparation	Develop Software Installation Plan (SIP) Establish software and/or documentation baseline. Establish the priority of the release-emergency, block, special. Capture software, required release date, identify sites for QT&E-II. Create release document. Identify the Difficulty Reports, Systems Advisory Notices etc. that are cleared by this release. Collect test data, test scripts, expected outputs etc. required by the software test plan. Collect the software onto magnetic media for transmittal to SSQ.	Atch 6.1.1-1
Formally Document the Software	Update the following: - Software Test Plan - Software Test Description - Computer Center Software Operator Manual - Software User Manual - Requirements Traceability Matrix	 MIL-STD-SDD MIL-STD-SDD MIL-STD-SDD MIL-STD-SDD Atch 5.1.1-1 (Page 5-226)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities in this stage.

Role	Responsibility
Project Office	Responsible for documenting the software design and coordinating with the user and support offices to ensure the design is complete, consistent, and actually reflects the users intention.
Support Offices	Provide support to the project offices as needed (see Appendix E).
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Source Code	Source code captured on appropriate media.
Software Test Plan (STP)	Describes the test approach, identifies the test to be performed, and provides schedules for test activities.
Software Test Description (STD)	Test cases and test procedures necessary to accomplish software testing.
Computer Center Software Operator Manual (CCSOM)	Describes all software operational requirements.
Software User Manual	Instructions for software user.
Software	The executable form of the program.
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent.
Security Certification Letter	An endorsed letter certifying the integrity of the software.
Software Installation Plan	Describes plans for installing software at user sites, training users, and converting from old systems.
Camera ready copy of printed documentation	User and operations manuals or updates, software installation plan, etc. as required.

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Product Summary, Cont'd

Product	Description
Publication Announcement	Announcement of manuals to be published.
Updated Requirements Traceability Matrix (RTM)	Matrix allowing software features to be traced back to system requirement.
Software Development Plan (SDP)	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Requirements	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs - Percent/Number of action items open/closed to date - Number of pages of documentation by document name; pages can be classified as text, tables, or figures
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office -- Support offices -- Software Process Assurance

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Measurement (Cont'd)

Type	Measurement
Size	(Systemity is a determinant of size. At this point, estimate size based on the number and type of requirements) * - Current estimate in Function Points * - Number of design components (screen, object) * - Number of design statements, program design language (PDL) statements, and structured narrative statements * - Number of pages in design documents - Number of process "bubbles" - Number of data "entities" * - Number of CSCIs, CSC, and CSUs * - Number of inputs/outputs * - Number of external interfaces * - Number of logical files - Number of source statements (source lines of design), program design language (PDL), and structured narrativestatements - Number of physical and logical lines of code (LOC) - Number of object code instructions - Number of words of memory - Number of screens - Number of operands and operators - Number of algorithms
Defects	- Category of defect (See DOD-STD 2167A, Appendix C) - Defect traceability to a specific stage - Number and type of defects per KSLOC - labor months, labor hours, and/or dollars of inspection/detection cost per defect - average Number of days to fix a defect - Number of tests - Number of test procedure steps - Number of pages of test documentation

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Measurement (Cont'd)

Type	Measurement
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars to date * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from sec 5.3.4

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	The software, test results, STP, and STD have been developed and documented.
	Project risks have been identified, documented, and their impact assessed.
	The software and manuals have been captured, prioritized, and documented.
	A coordination form has been completed and attached to the release package.
	Appropriate materials are ready to be forwarded to testers and editors.
	The software test plan has been executed using the test data and script that will be provided to SSQ.
	Applicable documents are finalized

5.4.2 Code and Test Work Review

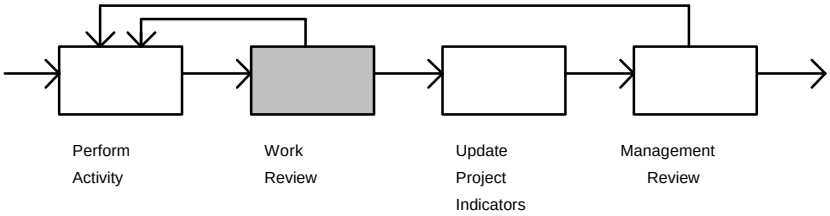
Purpose

The purpose of this review is to ensure that:

1. Appropriate support and system organizations have been identified and given the opportunity to assess the technical content of the source code and associated test plans.
2. Source code and test results are reviewed for technical content: - documented in accordance with SSC policies, procedures, and standards - stated in terms that are complete, consistent, feasible, testable, and usable.
3. Source code and test results are traceable to the original user's requirements, approved system and software requirements, and the approved software design
4. Technical risks are identified and documented.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Code and Test documents	All code and test related documents developed in the previous stage to include: STP, STD, SDP and Risk Analysis Document
Requirements Traceabililty Matrix	Matrix that allows software features to be traced back to the Software Design Document.
User Manuals	All software user manuals to include: CCSOM, and SUM
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Software Test Plan	Provides high-level planning for testing
Software Test Description	Provides test cases/procedures for testing
Policies, Procedures, Standards	All applicable directives that support or constrain the project.
Review Questionnaire/Checklist	Any questionnaire or checklist tools developed to assist the review process.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Develop and distribute review package.	Appendix A (Page A-10)
Conduct the Review	Review draft documents IAW the SSC Work Review Procedures. Materials to review: - Source code and test description/test plans/results - Security requirements - Release Document - Requirements Traceability Matrix - Verification and validation strategy - Updated Software Development Plan Ensure all software is: - developed in accordance with policy and standards - traceable to software design, system and software requirements Ensure the RTM is updated and correct Identify project risks	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project Risks - Product defects - Review action items - Review minutes - Review Panel recommendation	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities in this stage.

Role	Responsibility
Project Office	Presents source Code and Test results for review
System OPR	Represents system viewpoint, in review
Review Panel	Reviews material
Support OCR's	Support review panel, as needed, on specific items
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Code and Test Documents	STD, STP, updated SDP, Risk Analysis Document, Security Document
Review Defect Report	Defects identified during the review.
Review Action Items	Action Items taken during the review.
Review Minutes	Minutes of the review.
Review Recommendations	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Requirements	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs - Percent/Number of action items open/closed to date - Number of pages of documentation by document name; pages can be classified as text, tables, or figures - defects, errors, omissions found during review
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office prep -- Support offices prep -- Conduct of review

continued on next page...

Measurement (Cont'd)

Type	Measurement
Size	- Function Points or KSLOC * - Number of design components (screen, object) * - Number of design statements, program design language (PDL) statements, and structured narrative statements * - Number of pages in design documents * - Number of process "bubbles" * - Number of data "entities" * - Number of CSCIs, CSC, and CSUs * - Number of inputs/outputs * - Number of external interfaces * - Number of logical files * - Number of source statements (source lines of design), program design language (PDL), and structured narrative statements * - Number of physical and logical lines of code (LOC) * - Number of object code instructions * - Number of words of memory * - Number of screens * - Number of operands and operators * - Number of algorithms * - Number and type of defects per KSLOC * - Number of faults relative to security * - Number of major and minor defects (on an ordinary scale) * - labor months, labor hours, and/or dollars of inspection/detection cost per defect * - average Number of days to fix a defect * - amount of code reuse * - Number of tests * - Number of test procedure steps * - Number of pages of test documentation
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from Section 5.4.1

Exit Criteria

The source code, test plans, and test reports have been technically reviewed.

IF Review Panel ...	THEN ...
Approves Technical Content	Project proceeds to the Update Management Indicators stage.
Disapproves Technical Content	The source code, test plans, and test cases are recycled to the Code and Test Perform stage for further refinement.

5.4.3 Code and Test: Update Project Indicators

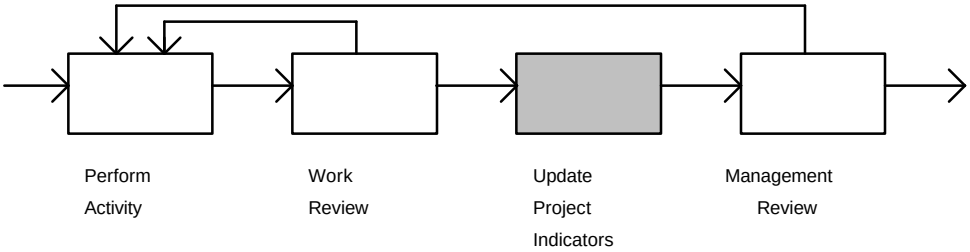
Purpose

The purpose of this process is to:

1. Update project management indicators - Size, Cost, and Schedule
2. Evaluate project risks and assess impact

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The STD and STP have been reviewed for technical completeness.
	Criticality and impact of software/documentation (to be released) is assessed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Code and Test Documents	Source code, STD, STP, RTM, SDP
Release Document	Signed Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Estimation Procedures	Current approved SSC estimation procedures.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-48)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities in this stage.

Role	Responsibility
Project Office	Perform activities associated with this stage.
Support Offices	Provide support as requested by Project Office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description
Size Estimate	Revised Size Estimate
Cost Estimate	Revised Cost Estimate
Schedule Estimate	Revised Schedule Estimate
Risk Analysis Document	Revised Risk Analysis Document

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirements	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs * - Percent/Number of action items open/closed to date * - Number of pages of documentation by document name; pages can be classified as text, tables, or figures
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office -- Support offices

continued on next page...

Measurement (Cont'd)

Type	Measurement
Size	* - Function Points or KSLOC * - Number of design components (screen, object) * - Number of design statements, program design language (PDL) statements, and structured narrative statements * - Number of pages in design documents * - Number of process "bubbles" * - Number of data "entities" * - Number of CSCIs, CSC, and CSUs * - Number of inputs/outputs * - Number of external interfaces * - Number of logical files * - Number of source statements (source lines of design), program design language (PDL), and structured narrative statements * - Number of physical and logical lines of code (LOC) * - Number of object code instructions * - Number of words of memory * - Number of screens * - Number of operands and operators * - Number of algorithms * - Number and type of defects per KSLOC * - Number of faults relative to security * - Number of major and minor defects (on an ordinary scale) * - labor months, labor hours, and/or dollars of inspection/detection cost per defect * - average Number of days to fix a defect * - amount of code reuse * - Number of tests * - Number of test procedure steps * - Number of pages of test documentation
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from sec 5.4.2

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

√	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.
	Project risks have been re-evaluated and their impact assessed.

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5.4.4 Code and Test: Management Review (Test Readiness Review)

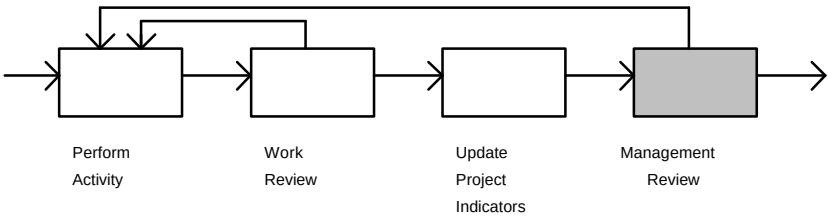
Purpose

The purpose of this review is to:

1. Provide management visibility
2. Approve/disapprove the software
3. Review revised project size, cost, and schedule estimate
4. Review project risk areas
5. Approve/disapprove continuation of the project
6. Approve and allocate resources and funding to accomplish the next phase
7. Approve the Product Baseline

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

√	Entry Criteria
	The software, Software Test Plan (STP), and Software Test Descriptions (STD) have been completed and reviewed.
	Project size, cost, and schedule estimates have been revised.
	Project risks have been analyzed and their impact assessed.
	System testing has been completed by the development office.
	The software and documentation have been baselined.
	The developer and the functional users are satisfied that the application meets the requirements identified at the inception of the project.
	Any waivers to product standards have been approved.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following input(s) are required for this stage.

Input	Description
Source Code	Source code
Software Development Plan	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.
Requirements Traceability Matrix	Matrix allowing software features to be traced back to system requirement.
Software Test Plan	Module test plan
Software User Manual	Provides instructions on how to operate the system
Software Installation Plan	Describes plans for installing software at user sites, training users, and converting from old systems.
Files List	List of all files to be included in release
Updated Project Estimates	Size, Cost, and Schedule
Work Review Minutes	Minutes from the Work Review.
Work Review Action Items	List of all Action Items from the Work Review.
Work Review Recommendation	Recommendation from the Work Review.
Review Questionnaire/ Checklist	Any questionnaire or checklist tools developed to assist the review process.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Develop and distribute review package Review requirements for conducting a Test Readiness Review (See TRR Question Set)	Appendix A (Page A-10) Atch 5.4.1-1 (Page 5-249)
Conduct the Review	Review documents IAW the SSC Management Review Procedures. Materials to review include: - Overview of the software and test plan Document - Overview of Work Review (Action Items, Recommendations) - Revised estimates - Status of effort expended to date - Funding requirements - Resource Impact and Cost - Plans to accomplish near-term actions - SSC manpower requirements; Direct, Support, Overhead, System Identify project risks Decisions to make: - baseline software and test plans - approve/disapprove continuation of the project	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish: - Project Risks - Product defects - Review action items - Review minutes - Any changes that need to be made to the baseline must be identified, evaluated, assessed for risk, documented, planned, communicated to the affected groups or individuals and tracked to completion. The changes must be reprocessed through the Needs Analysis phase. - Approval/disapproval decision	Appendix A (Page A-15)

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove
Project Office	Presents review material to management
Review Panel	Assist Management in the decision process
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Source Code, STP, STD, SDP	Becomes the product baseline.	F
Approved Updated Project Estimates	Revised size, cost, and schedule estimates	I
Risk Analysis Document	Management risks identified during the review	I
Review Defect Report	Defects identified during the review.	I
Review Action Items	Action Items taken during the review.	I
Review Minutes	Minutes of the review.	I
Approval Authority's Continuation Decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	I

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Requirement	* - Number of requirements to be addressed by the software portion of the project * - type of requirement (i.e. input, output) * - associated risks (i.e. critical, noncritical) * - Number of risk management activities associated with the development activity * - Number of manning positions authorized and assigned to include terms and temporary hire * - Number of ECPs * - Percent/Number of action items open/closed to date * - Number of pages of documentation by document name; pages can be classified as text, tables, or figures
Schedule	* - estimated schedules and elapsed time in weeks, months, and/or years * - milestones or events * - Percent of schedule elapsed * - elapsed development time - hours expended categorized by: -- Project office -- Support offices -- Review time
Size	* - Function Points or KSLOC * - Number of design components (screen, object) * - Number of design statements, program design language (PDL) statements, and structured narrative statements * - Number of pages in documents * - Number of process "bubbles" * - Number of data "entities" * - Number of CSCIs, CSC, and CSUs * - Number of inputs/outputs * - Number of external interfaces * - Number of logical files * - Number of source statements (source lines of design), program design language (PDL), and structured narrative statements * - Number of physical and logical lines of code (LOC) * - Number of object code instructions * - Number of words of memory

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Measurement (Cont'd)

Type	Measurement
Size (Cont'd)	* - Number of screens * - Number of operands and operators * - Number of algorithms * - Number and type of defects per KSLOC * - Number of faults relative to security * - Number of major and minor defects (on an ordinary scale) * - labor months, labor hours, and/or dollars of inspection/detection cost per defect * - average Number of days to fix a defect * - amount of code reuse * - Number of tests * - Number of test procedure steps
Cost	* - initial estimate of cost in labor months, labor hours, and/or dollars * - budgets in labor months, labor hours, and/or dollars * - amount spent in labor months, labor hours, and/or dollars <u>to date</u> * - Percent of budget spent to date (labor months, labor hours, and dollars) * revise from sec 5.4.3

Exit Criteria

Management has commitment to allocate resources to test the software. The software and test plans are baselined. Otherwise, the software and test plans are recycled through the Code and Test Perform Activity stage or the project is canceled.

IF Approval Authority ...	THEN ...
Approves Continuation	The project proceeds into the turn-in activity for independent testing.
Disapproves Continuation	The requirements package is recycled to the Code and Test Perform Activity stage for further refinement.
Cancels Project	Refer to Cancellation process (see Appendix H).

Attachments

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Atch 5.1.1-1
System Requirements and Analysis Procedures

	Obtain training on requirements analysis
	Ensure the requirement team is knowledgeable in the requirement gathering process(es).
	Ensure the requirement team is familiar with the requirement analysis methodology and the tool usage if applicable.
	If the personnel are inexperience in either area, arrange to provide proper training to those who need it by contacting the Directorate of Professional Development.

	Review existing documentation/software
	Review the approved Software development plan , Operational Concept document and any existing documentation.
	Gather and record any reuse opportunities within the domain. The data gathered during this process forms the basis for identifying areas within the domain where reuse can be most effectively implemented.

	Identify and Evaluate Reusable System Requirements
	Search the Air Force Defense Software Repository System (AFDSRS) similar software (see Appendix F)
	Evaluate the identified reusable requirements assets to determine its suitability.

	Specify the requirements for the System or a Segment of the System

	STEP ONE: Review the System/Segment Specifications Data Item Description (DID) and understand the requirements for completion. A quick list of requirements as extracted from the DID follows. Each number corresponds to a number in the DID.
	3.1 Definition. Briefly describe the system and provide a high level system architecture diagram. Address operational, interface, and logistical considerations and concepts. Address if the system must operate in more than one state or mode such as idle, ready, active, post-use analysis, training, degraded, emergency, backup, wartime, peacetime.
	3.2 Describe system characteristics such as:
	3.2.1 Performance
	3.2.2 Database requirements and names that must be incorporated into the system, including data elements, characteristics, relationships and storage capacity.
	3.2.3 External interface requirements including

continued on next page ...

Atch 5.1.1-1, Continued
System Requirements and Analysis Procedures

	3.2.3.1 External interface name and physical interface requirements, communication/data transfer requirements, nature of inputs and outputs, security or privacy requirements.
	3.2.4 Physical characteristics such as weight limits, etc.
	3.2.5 System quality factors including:
	3.2.5.1 Reliability
	3.2.5.2 Maintainability
	3.2.5.3 Availability
	3.2.6 Environmental requirements specifying any requirements concerning the environment within which the system is required to operate.
	3.2.7 Transportability (special requirements for transportation and handling)
	3.2.8 Flexibility and expansion
	3.2.9 Portability (special requirements for employment, deployment, rehosting)
	3.3 Specify any minimum design and construction standards including:
	3.3.1 Materials
	3.3.2 Electromagnetic radiation
	3.3.3 Nameplates and product marking
	3.3.4 Workmanship
	3.3.5 Interchangeability
	3.3.6 Safety
	3.3.7 Human engineering
	3.3.8 Nuclear control
	3.3.9 System security and privacy
	3.3.10 Government furnished property usage.
	3.3.11 Computer resource reserve capacity.
	3.4 Specify requirements for system documentation such as specifications, drawings, technical manuals, test plans and procedures, and installation instruction data.
	3.5 Specify any logistic considerations and conditions that apply to the operational requirements.
	3.6 Specify any requirements for personnel and training.
	3.7 Identify and describe each segment of the system and the relationships among the segments.
	3.8 Specify any order of precedence or assigned weights indicating the relative importance of the requirements.
	4. Define a set of qualification methods to be used to ensure each requirement in Sections 3 and 5 has been met.
	4.1 Qualification methods may include: Demonstration; Test; Analysis; Inspection. 4.2 Specify special tests required for sampling.
	5. Specify requirements for the preparation of the system and all its components for delivery, including packaging and handling.
	STEP TWO: Gather and review all documentation previously drafted which might provide insights for this procedure. This includes at the very least the Software Development Plan (SDP), and the Operational Concept Document (OCD) or Operational Requirements Document (ORD). From these documents, extract all those items that can be used to draft the SSS.

Atch 5.1.1-1, Continued
System Requirements and Analysis Procedures

	Develop Interface Requirements Agreement (IRA)
	Establish an Interface Control Working Group (ICWG).
	Develop a charter (Figure 5.1.1-1), which contains instructions on how to establish and conduct an ICWG.
	Once the ICWG is established, call a meeting for all to attend; the agenda for this meeting will be to discuss the development or re-engineering effort.
	- Complete a system interface worksheet for each system that you interface with (Figure 5.1.1-2).
	Established an IRA for each system that your system will interface with (including legacy systems). See instructions for completing an IRA at Figure 5.1.1-3.
	Create an interface status matrix chart/slide (Figure 5.1.1-4) to brief at each formal review. - List the activities required to draft and formalize the IRA across the top of the matrix. - Enter a check mark in the appropriate box for each completed activity. - Indicate overall status of an activity in the last column; consider using the letters and colors G (green), Y (yellow), or R (red) with an up/down arrow in the appropriate box.
	A sample of how the ICWG fits into the overall interface requirements process is at Figure 5.1.1-5.
	Once the IRA is signed by each ADS manager, it forms the basis for the Interface Requirements Specifications (IRS), which is baselined at the SSR.

	Develop Requirements Traceability Matrix
	Review the requirements traceability matrix created in the System Requirements Phase and make the updates identified in the Software Design Document

Figure 5.1.1-1
Interface Control Work Group (ICWG) Charter (Sample)

S[ADS Name]

The [ADS Name] ICWG serves as the official communications link between program participants to resolve interface problems, document interface agreements, and coordinate Engineering Change Proposals. The ICWG is established to review, analyze, and evaluate interface requirements, which may impact particular aspects of the [ADS Name] software development effort.

1. Authority. General authority for forming an ICWG is contained in MIL-STD-493A. Formation of [ADS Name] ICWG is directed by the Communications-computer Systems Program Plan for the [ADS Name].

2. Organization. ICWG membership will consist of one member from each of the contractors and representation from each automated data system (ADS) that interfaces with [ADS Name]. A roster of all agencies represented on the ICWG will be maintained by the ADS Program Manager and will be provided to all participants. The ICWG will be chaired by the [ADS Name] Program Manager.

3. Interface Requirement Agreement (IRA). An IRA is an agreement between [ADS Name] and an external ADS that documents the interface data requirements between the two systems. The IRA must be written in sufficient detail to convey to the developer exactly what data, in what format, and how often the systems need to interface. IRAs will be scheduled for completion, released by the originating agency, signed by the interfacing participants, and approved by the ICWG chairperson prior to the time of the applicable design review.

4. Responsibilities. The participating contractors and the [ADS Name] Program Management Office will have collateral responsibilities where required.

a. Duties of the Chairperson. The chairperson shall:
   1. Serve as the ICWG's voice for the [ADS Name] program management staff on interface or integration matters.
   2. Coordinate with other [ADS Name] working groups as necessary.
   3. Have the authority to delegate to a Co-Chairperson or Recorder.

b. Member Duties.
   1. Serve as their organizations' or ADS' primary point of contact on interface matters.
   2. Assist in the preparation and review of the IRA for the [ADS Name] Program.
   3. Brief their organizations' interface issues and concerns to the ICWG as necessary.
   4. Ensure that their organizations are fully aware of any [ADS Name] requirements that may impact the organization.

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Figure 5.1.1-1 Continued

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5. Respond to action items assigned during ICWGs.
6. Submit proposed agenda items to the ICWG Secretariat.
7. Coordinate on IRAs applicable to their organization.

c. Secretariat Duties.

1. Notify members of date, time, location, and intended purpose of all ICWG meetings scheduled by the ICWG Chairperson.
2. Ensure minutes are taken and verify their accuracy. Prepare, publish and distribute the minutes of the ICWG.
3. Serve as the membership's primary point of contact for monitoring action items and passing recommendations to the program office.
4. Schedule ICWG meetings as required to revise IRAs or provide technical advice.
5. Establish agenda for meetings based on recommendations from members.
6. Prepare, publish, distribute, and update the ICWG charter.

5. Procedures. ICWG meetings will be held annually or at the call of the ICWG chairperson. The chairperson can convene meetings with selected ICWG members to discuss individual ADS interfaces. ICWG members may requires a meeting by submitting proposed agenda items to the ICWG chairperson. Each organization will plan and fund for their participation at the meeting.

6. Action Items. The chairperson is responsible for documenting all action items, the organizations affected by the action items, and point of contact for the resolution of action items. The chairperson is responsible for ensuring that the action items are brought to the attention of the responsible parties and that a resolution is achieved that does not adversely affect the cost, schedule, or performance of the [ADS Name] modernization program.

7. The ICWG members are listed at Attachment X. Any changes to the ICWG membership should be forwarded to the ADS Program Manager 7 days prior to the effective date of the change.

Figure 5.1.1-2

System Interface Worksheet (Sample)

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1. System Name: [The name of the system with which your system will interface.]

2. System Code: [This is the code used to identify the system; an example is GV, the system designation for SBSS.]

3. Point of Contact (POC): [Record the name, address (both mailing and E-mail), organization, telephone and FAX numbers of the ICWG point of contact. As a minimum, this information should be gathered for the ADS manager.]

4. System Security: [Record the highest security classification and level of the system.]

5. Platform: [Describe the hardware platform supporting the ADS; examples are Unisys 2200 and Sun Workstations.]

6. Platform Configuration: [Describe the configuration of the system; examples are stand-alone, mainframe, workstations on a LAN.]

7. Operating System: [Record the type of operating system; examples are DOS, UNIX, SCO UNIX, and VMS. This information determines which conversions may be required on the exchanged data.]

8. Interface Message(s): [Record the message name(s)and direction of interface. Example: AFC2S-LOGPLAN INCOMING; MDS-PDS OUTGOING.]

Figure 5.1.1-3
Developing an Interface Requirements Agreement (Sample)

The Problem Domain Experts (PDEs), in concert with the ICWG, draft the IRAs. The information from the draft IRAs are incorporated in the Software Requirements Specification as external interface requirements and are reviewed during the technical review for the SDR. The following is the minimum information required for developing software for external interfaces:

A. Automated Data Systems (ADS) Information.

1. System Name: The name of the system with which your system will interface.
2. System Code: This is the code used to identify the system; an example is GV, the system designation for SBSS.
3. Point of Contact (POC): Record the name, address (both mailing and E-mail), organization, telephone and FAX numbers of the prime point of contact. As a minimum, this information should be gathered for the ADS manager.
4. System Security: Record the highest security classification and level of the system with which your system will interface.
5. Platform: Describe the hardware platform supporting the ADS; examples are Unisys 2200 and Sun Workstations.
6. Platform Configuration: Describe the configuration to the system; examples are stand-alone, mainframe, workstations on a LAN.
7. Operating System: Record the type of operating system; examples are DOS, UNIX, SCO UNIX, and VMS. Also include the version of the operating system. This information determines which conversions may be required on the exchanged data.
8. Interface Message(s): Record the message name(s)and direction of interface. Example:

AFC2S-LOGPLAN	INCOMING
MDS-PDS	OUTGOING

9. Interface Methods: Describe how the systems will communicate including any variables which may exist or alternate capabilities which may be used. Describe back-up and/or recovery procedures. Possible interface method levels are: air gap, electronic file transfer, and Electronic Data Transfer.

   (a) For any method of communication, record the following:

   (1) Sending (source) directory and file name.

   (2) Sending (source) file physical location.

   (3) Receiving (destination) directory and file name.

   (4) Receiving (destination) file physical location.

   (5) File type (Binary, ASCII, EBCDIC).

   (6) File size (maximum).

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Figure 5.1.1-3, Continued

(7) File size (average).

(8) Time constraints (Routine, Priority).

(9) Transfer media (Defense Data Network [DDN], Modem, Defense Switched Network [DSN], Air Gap).

(b) For electronic methods, record the following:

(1) Protocol (TCP/IP, GOSIP, KERMIT).

(2) Security requirements/constraints.

(3) Source machine Internet address.

(4) Destination machine Internet address.

(5) System sign-on and password procedures. Discuss how the sign-on and password procedures are obtained.

(6) Disk permanent file name (PFN). If the interface is accomplished using a disk file, record the PFN of the file, the owner identity (ID), and the device set for the file used.

(c) For EDI record the formatting standard to be used (X12, other).

(d) For air gap method record the following:

(1) Diskette size (5.25, 3.50).

(2) Diskette density (low, high).

(3) Diskette format (DOS, UNIX).

(4) Tape type (cartridge, cassette).

(5) Type size (9", 8 mm).

(6) Tape blocking factor. The number of records on a block.

B. Message Information.

1. Message Name.
2. Purpose of Message.
3. Security Classification.
4. File Export Format.
5. Communication Method(s).
6. Message Creation Trigger.
7. Message file name (include full path).
8. Interface Procedures.
9. Receiving System's Directory.
10. Sending System's Directory.

continued on next page...

Figure 5.1.1-3, Continued

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11. Message Content.
    (a) Header Record Information.
        (1) Message Producer's ADS code.
        (2) Message Identifier Number.
        (3) Message Version Date.
        (4) Message Title.
        (5) Number of Images Sent.
        (6) Sending organization
        (7) Receiving organization
12. Detail Message Data.
    (a) Sequence of Message Data.
    (b) Record Structure and Data Elements for Each Record.
        (1) Column Position of Data Elements in the Record.
        (2) Data Element Name.
        (3) Data Element Size.
        (4) Data Element Type.
        (5) Edits (optional).
13. Trailer Record. This will be a way of signifying the end of a particular message.
14. Message Services and Responsibilities. When a message reaches its destination, it should have a particular service or responsibility. For example, incoming messages could apply to the data base or generate a report.

C. ADS responsibilities in relation to support for testing of the interface. Include the projected date of the interface test, and any responsibilities the ADS may have in testing the interface. Quarter and year are acceptable for the IRAs. A memo must be signed later to specify a testing date. Examples of an ADS responsibilities are: providing test data across the interface (for incoming data), and providing verification of test results (for outgoing data). Document the responsibilities for both interfacing systems.

D. Points of Disagreement.

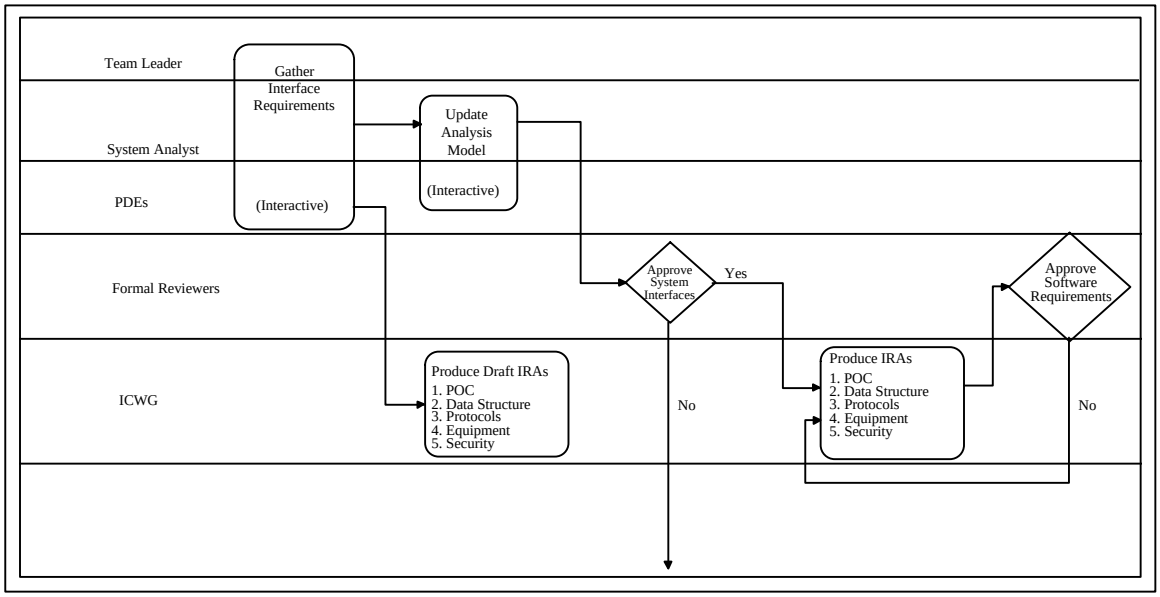
E. Signatures. For the IRA to be official, it must bear the signatures of both ADS representatives.

Figure 5.1.1-4
Data Interface Status Chart

INTERFACES	DEFINE REQUIREMENT	MODEL SYSTEM	NEW DATA DEFINED	MEET WITH OPR	DRAFT DATA ELEMENTS	DRAFT META-DATA	DEFINE STRUCTURE	SYNC SCHEDULE	IRA SIGNED	DOCUMENT INTERFACE	ASSESSMENT

▲ IMPROVING ▼ WORSENING G SATISFACTORY Y MARGINAL R UNSATISFACTORY

Figure 5.1.1-5
Interface/ICWG Requirements Process Chart



Development:	Interface/ICWG Requirements Process Chart

Atch 5.1.1-1, Continued
System Requirements and Analysis Procedures

	System/Segment Design
	Step One: Review the System Software Design Document Data Item Description in MIL-STD-SDD for detailed requirements for completion. A quick checklist of requirements follows (numbering corresponds to the DID numbering).
	1.2 Provide a System overview.
	3. Provide a System/segment behavioral design.
	- describe design decisions such as:
	-- allowed/expected inputs/operations;
	-- planned behavior in response to each of the above;
	-- displays, reports
	-- databases
	-- flexibility and the levels of availability, integrity, and confidentiality.
	4. Describe the system architecture.
	- describe internal structure.
	- identify the segments, Hardware Configuration Items (HWCI), and Communications-Computer System Configuration Items (CSCI); the relationships among the segments.
	- identify a high-level description of each external interface of the system.
	5. Identify the system/segment requirements allocated to each HWCI, CSCI and manual operation.
	6. Describe the system's processing resources including memory size; word size; processing speed; character set standard; instruction set architecture; interrupt capabilities, direct memory access; channels and channel capacities; auxiliary storage capacities; growth capabilities, diagnostic capabilities; and additional hardware capabilities, allocation of pertinent processing resources to each CSCI.
	7. Develop the Requirements Traceability Matrix (see Atch 5.4.2-1).
	Step Two: Gather and review all documentation previously drafted which might provide insights for this procedure. This includes at the very least the Software Development Plan (SDP); the Operational Concept Document (OCD) or Operational Requirements Document (ORD) if following DoD Instruction 5000.2; the System/Segment Specification (SSS); the Software Requirements Specification (SRS); the Interface Requirements Document (IRS); or any consolidated documents that may have been required previously. Extract any information from the above documents that can be used to draft the SSDD.

Atch 5.2.1-1
Software Requirements Analysis Procedures

	Obtain training on requirements analysis
	Ensure the requirement team is trained in requirement analysis methodology(ies).
	Ensure the requirement team is knowledgeable in the selected requirement analysis methodology and tools usage if applicable .
	If the personnel are inexperience in either area, arrange to provide proper training to those who need it by contacting the Directorate of Professional Development.

	Review system requirements
	Review the approved System Segment Specifications , Interface Requirement Agreement.

Ref(s): Additional reading: Alan M. Davis, <u>Software Requirements Analysis & Specification</u>, Prentise Hall, 1990.

	Develop the Software Requirements Specification (SRS)
	STEP ONE: Review the requirements. A brief checklist follows:
	1. Define the computer software configuration item (CSCI). Each CSCI should have an SRS. In defining the CSCIs, include those characteristics that are a condition for its acceptance; defer to design documents those characteristics that the customer is willing to leave up to the developer.
	2. Identify each required CSCI-external interface and specify the CSCI requirements associated with each interface. The Interface Requirements Specification (IRS) may be referenced
	3. Itemize the requirements associated with each capability, function, subject or object of the CSCI. Ensure each requirement is stated that an objective test can be defined for it. Include the following:
	3.1 Response times, sequencing, accuracy, capabities, priorities, continuous operation requirements and allowable deviations.
	4. Identify an requirements imposed on the interfaces between the capabilities identified above.
	5. Specify any requirements imposed on the data elements internal to the CSCI.
	6. Specify any adaptation requirements for the CSCI.
	6.1 Describe any site-unique data required by each installation.
	6.2 Describe any parameters required by the CSCI that may vary within a specified range according to operational needs.
	7. Specify CSCI sizing and timing requirements
	8. Specify any safety requirements applicable to the CSCI
	9. Specify any CSCI requirements concerned with security and privacy.
	10. Specify any other requirements that constrain the CSCI design.
	11. Specify any software quality factors and the method to determine whether each has been met, including: reliability, maintainability, availability, flexibility, portability, reusability, testability, usability, and other attributes.

continued on next page ...

Atch 5.2.1-1, Continued
Software Requirements Analysis

	12. Specify any human factors engineering requirements.
	13. Update the Requirements Traceability Matrix developed previously.
	14. Define a set of qualification methods to ensure each requirement noted above has been met. Qualification methods include: demonstration; test; analysis; inspection.
	STEP TWO: Review all the DIDs that have been developed previously. Particular attention should be given to the Operational Concepts Document (OCD) for it is here that the SRS originates--corresponding SRS requirements can be found in the OCD. For example, the capabilities and functions specified in the OCD chapter on "Capabilities/functions of the new or modified system" should be adequately detailed to extract CSCI definitions (Step One paragraph 1 above). "The SRS contains a complete description of the external behavior of the software system."
	STEP THREE: Develop the SRS.
	1. Purpose of an SRS is to: 1) communicate how the system will look to the system's environment or the user; 2) serve as the basis for system testing and verification activities; and 3) help control the evolution of the software system.
	2. Not included in an SRS are project administrative requirements; designs (which optimizes the requirements/analysis phase); and product assurance plans.
	3. Include behavioral requirements of what the system does and non behavioral requirements of the attributes of the system as it performs its job.
	3.1 Behavioral requirements define precisely what inputs are expected by the software, what outputs will be generated by the software, and the details of relationships that exist between those inputs and outputs.

	Develop the Interface Requirements Specifications (IRS)
	Include all data from the approved and signed IRAs into the IRS
	Incorporate security requirements
	Negotiate testing with all applicable ICWG members for all interfaces. NOTE: Test as many functions as possible and as early as possible to prevent unforeseen problems later in the development

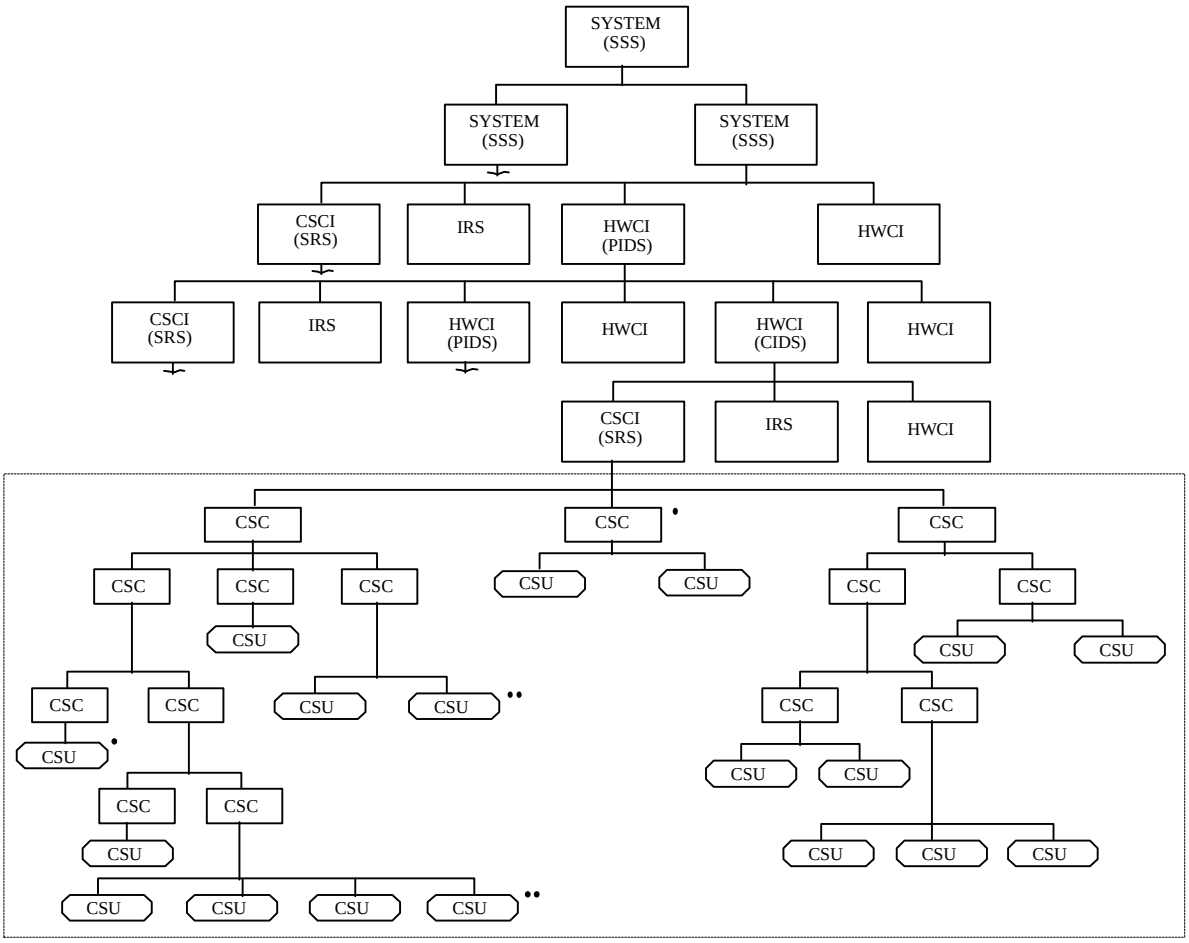
	Update Requirements Traceability Matrix
	Review the requirements traceability matrix created in the System Requirements Phrase and make the updates identified in the Software Requirement Document and the Interface Requirement Document accordingly.

Atch 5.3.1-1
Software Design Procedures

	Review System and Software Requirements Documents
	Determine if there have been any major changes in the System and Software Requirements Documents.
	If there are changes, determine if the changes impact the software design schedule.
	Ensure that changes to the system and software requirements are complete, consistent, unambiguous, feasible, and testable.
	Ensure all changes are traceable to the requirements documents.
	Identify any risks that might impact the design.

	Architectural Design (High Level)
	If applicable, create a graphical hierarchy system breakdown and CSCI decomposition chart (Figure 5.3.1-1)
	Show the relationship between the CSCI and other configuration items in the system.
	If applicable:
	Label each software unit and briefly state its purpose.
	Show the flow of execution control among software units.
	Show method of sequence control.
	Show logic and input conditions such as timing variations, timing relationships between interrupt or sensing operations, and priority assignments.
	Show flow of control for exceptions and other error detection recovery features.
	Show flow of control between concurrently executing processes
	Show the flow of data among software units.
	Identify any non-developmental software to be incorporated into the CSCI.
	Identify the allocation of memory and processing time to each software unit; consider creating a memory/processing time table.

Figure 5.3.1-1
Graphical Hierachy Chart



• NON-DEVELOPMENTAL SOFTWARE
•• SAME CSU USED BY DIFFERENT CSCs

Example of a system breakdown and CSCI decomposition.

Development:	Graphical Hiearchy Chart

Atch 5.3.1-1, Continued
Software Design Procedures

Ref(s): Data Base Design Document, Data Item Description

	Data Base Design
	ENVIRONMENT:
	Identity all systems that will use this database, including ADS system code
	Estimate internal and peripheral storage requirements for the database.
	Identify multiple storage requirements for distributed processing, if applicable.
	Consider differences in modes of operation following emergencies or disasters, or during deployments.
	Map the components of the database to one another and to the files on which they will be recorded.
	Describe the data communications environment in which the database will be installed, ie, consider if the data base will be installed on a single platform, multi-platforms, or whether data will be shared.
	LABELING: Describe internal labeling conventions.
	ORGANIZATION:
	Describe any major design considerations for the organization of the database.
	Describe the conceptual model used for the database--use an entity-relationship diagram. **(See attached sample)**
	Provide information needed to ensure consistency of design concerning the organization and manipulation of the **physical** database areas/files.
	Provide the following information for each area/file;
	General design and format
	Rationale for the design
	Inter-area/file dependencies
	SPECIAL INSTRUCTIONS:
	Provide instructions to be followed by personnel who will contribute to the generation of the data base and who will use it for testing and operational purposes.
	SUPPORT SOFTWARE/UTILITIES:
	Identify and briefly discuss the support software directly related to the data base, such as:
	Database analysis software for reorganizing or changing the data
	Database sizing software or initializing of resizing the database
	Database loading software for moving or copying data
	Database repairing software.
	SYSTEM INFORMATION:
	Identify the Data base Management System (DBMS) to be used, and the vendor, version or release, and targeted hardware of the DBMS
	Describe the use and management of integrity and access controls that apply to all data base components, such as schema, subschemas, areas of physical files, records or tables, sets or relations, and data elements

continued on next page ...

Atch 5.3.1-1, Continued
Software Design Procedures

	SCHEMA INFORMATION:
	Describe the overall structure to be reflected in the schema or global definition of the database.
	Describe the schema and each subschema of the database. Describe the content of the database, listing its data elements and indication within which subschemas of the database they are visible.
	Describe and depict in a chart the **logical organization** of the data into records, tuples (row), sets, or predefined relationships.
	Describe and depict in a chart the physical structure (ie, areas/files, indexed, pointers) of the logical components of the data base.
	Include sizing formulas for determining the storage required to support the database content and associated software
	Describe the method for recovery or re-creation of the schema and support files
	AREA\FILE INFORMATION:
	Describe the content of each area/file, listing the records it contains and explaining their purposes.
	Describe each area/file, including name, type, code, mapping, limitations and controls, access procedures and mechanisms, and training or testing capabilities
	Provide information about data storage and any limiting factors, such as allocation parameters and methodology, etc.

Atch 5.3.1-1, Continued
Software Design Procedures

Ref(s): AFM 171-100, Vol I; Technical Architecture Framework for Information Management (TAFIM) and SSCR 700-10, Graphical User Interface Standard; AFR 205-16 and SSCR 205-16; Software Design Document

	Detailed Design (Software Sub-component)
	Review the Software Interface Documents for all systems that will interface with this CSCI.
	Provide a design description of each software unit of the CSCI, using diagrams, tables, flow charts, or a program design language.
	Review AFM 171-100 or other applicable references for standard charting symbols.
	Review TAFIM for standard data displays and manipulation if applicable.
	Review TAFIM, Volumes 1-8 as follows: - Overview, Version 2.0, 1 Nov 93 - Technical Reference Model and Standards Profile Summary, Version 2.0, 1 Nov 93 - Architecture Concepts and Design Guidance, Version 2.0, 1 Nov 93 - Standards Based Architecture Planning Guide, Version 2.0, 20 Oct 93 - Acquisition of IT and IM Products Support Plan (currently being written) - Department of Defense (DoD) Goal Security Architecture (DGSA), Version 1.0, 1 Aug 93 - Information Technology Standards Guidance for An Open System Environment (ITSG_OSE) DRAFT - Department of Defense HCI Style Guide, Version 3.0, 30 Sep 93
	Review AFR 205-16 and SSCR 205-16 for Communications-Computer security procedures and responsibilities, if applicable
	Describe each ***software unit*** by name and a project-unique identifier.
	Describe the purpose of the software unit.
	Identify the requirements allocated to the software unit from the software requirements specification.
	List and describe algorithms to be incorporated into the software unit.
	List and explain any constraints, limitations, or unusual features in the design.
	Specify the programming language to be used and rationale or policy for its use.
	Use AFM 171-100, Vol I, Section 7 for standard software languages, if necessary.
	Identify what software units, if any, will be implemented with existing reusable software.
	Provide the identifier of the reusable software, the software library where it resides, and its associated design document.
	If software from this design will be reused, identify the program library where the software will be placed.
	Identify all inputs, outputs, and other data elements of the software unit, including as applicable: - Accuracy and priority
	- Precision/resolution in terms of significant digits
	- Frequency with which the data element is input, calculated, refreshed, or output such as 10 Khz, 50 Msec, etc.
	- Legality checks to be performed on the data element
	- Data type such as integer, ASCII, fixed, real, enumeration, etc.
	- Data representation/format/structure
	- Sources, including other software units where the data element is set or calculated
	- Destinations, including other software elements where the software is used
	- Maximum size and storage needs
	- Access methods, such as random, direct, or sequential

Development:	Software Design Procedures

Atch 5.3.1-1, Continued
Software Design Procedures

	The logic flow to be used by the software unit including: - Conditions under which software unit execution is initiated
	- Conditions under which control is passed to other software units
	- Response and response time to each input, including data conversion, renaming, and data transfer operations
	- Dynamically controlled sequencing during the software unit's operation, including:
	-- The method for sequence control
	-- The logic and input of that method, such as timing variations, priority assignments
	-- Data transfer in and out of memory
	-- The sensing of discrete input signals, and timing relationships between interrupt operations within the software unit
	Use AFM 171-100, Vol I, Section 9 for standard output products

	Design Interfaces(s)
	Refer to the Interface Design Document, Data Item Description**.**

	Develop Design Prototypes
	Create routines using a program design language or code, to test specific, complex design areas that may have a high risk impact on overall design/schedule
	Employ tools that can provide the user an advance view of how screen displays will look
	Consider all allowable hardware and software configurations

	Periodically Review and Inspect the Design
	Setup internal workshops to perform informal, structured walk-throughs and reviews to verify the design is traceable to the System and Software requirements

	Perform Structured Walk-through of the Design
	Ground Rules:
	- Goal is to produce efficient code which is modifiable and maintainable
	- Held in private and no participant will discuss the proceedings to any non-participant
	- Critique the logic, not the person or the personality
	- Each technician will have their work critiqued; thus every technician will both receive and give criticism
	- Each originator of logic must feel free to discuss weaknesses and ask advice
	Procedures:
	- When each item (module, subsystem, program, routine, etc.) is completed, the lead programmer will designate two people to participate in a design walk-through
	- Select a private location free from interruptions
	- Invite the functional analyst, depending on the size or complexity of the item
	- The lead programmer will provide copies of each item 2 - 3 days prior to the walk-through
	- The programmer will fully describe the logic, code, or documentation in great detail to ensure the participants understand it's rationale

continued on next page...

Atch 5.3.1-1, Continued
Software Design Procedures

	- Listen and offer alternatives if the alternatives are better in some way such as speed, size, more modifiable, or more easily maintained
	- Ensure there are no side conversations, distractions, and do not waste time
	- Document a summary of all findings and recommendations and obtain all participants' signatures
	- The lead programmer may prepare a Memo for Record for the ADS manager, if deemed necessary

	Coordinate Tasks with Appropriate Working Group(s)
	Determine if any external working groups are working any issues that could impact the design
	Inform the working group(s) that you have completed the ***software*** design
	Arrange a briefing to the group(s)

	Requirements Traceability Matrix
	Review the requirements traceability matrix created in the System Requirements Phase and make the updates identified in the Software Design Document

	Update draft(s) of all Test Documentation
	Review the Software Test Document(s) and make appropriate updates to ensure consistency with the Software Design Document

Ref(s): Software Test Plan (STP)/Software Test Descriptions(STD), Data Item Descriptions (DID).

	Define / Document Integration Test Criteria and Strategy
	CRITERIA; identify the following:
	Accuracy requirements for test results
	Allowable upper and lower bounds of test results
	Maximum and minimum duration of tests, in terms of time and number of events, to obtain the results
	Conditions under which the test results are inconclusive and re-testing is to be performed
	Severity of processing errors associated with the test result
	Additional criteria that may be unique to this design
	STRATEGY; provide the following:
	Operator actions and equipment operations required for each step
	Expected results for each step
	Evaluation criteria for each step, as applicable
	Actions to follow in the event of a program stop or indicated error
	Procedures to be used to reduce and analyze test results

	Contact Appropriate Working Group(s)
	Determine if any working groups are working any issues impacting the design
	Inform the working group(s) that you have completed the ***software*** design and all documentation
	Arrange a briefing for the group(s)

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Atch 5.4.1-1
Code and Test Procedures

Ref(s): Software Development Plan; Software Design Document; Software Test Plan

	Obtain training in Code and Testing Methodology
	Ensure the coding team is proficient in the prescribed development language(s).
	Ensure the coding/testing team is familiar with the accepted testing methodology.
	If the personnel are lacking in either area, arrange to provide proper training to those who need it by contacting the Directorate of Professional Development.

	Prepare Publication Announcement
	Prepare and submit to SSC/SSQ a brief synopsis of publications to be published at least 120 days prior to the anticipated publication date. The narrative description is used to solicit requirements, by publishing it in the weekly Air Force Publication Bulletin, so the Publication Distribution Offices can collect distribution requirements from all activities they service. The letter will include the following: (1) Publication number, volume number, and title; (2) A brief synopsis of the publication; (3) A statement of who should order or should use the publication; (4) The distribution symbol; (5) The OPR office symbol; and (6) The preparing agency office symbol, if different from the OPR.

FIGURE 5.4.1-1

Sample announcement of documentation for publication:

FROM: SSC/SMX (Mr Doe/4200)

SUBJECT: Request for Announcement of AFM XX-XXX, Volume XX in Publishing Bulletin

TO: SSC/SSQ

1. Request the following publication be announced in the Air Force Publishing Bulletin. AFM X-XXX, Volume XX, Z-100, Contingency Operation/Mobility Planning and Execution System (COMPES) Combat Logistics System (CLS) Computer Aided Load Manifesting (CALM): A200B/AU, Users Manual/Operations Manual.

2. This manual provides user information pertaining to the inputs required, operating procedures, and outputs produced by the system. This manual will be required for load planners in all units with mobility requirements. Distribution will be "L." OPR: HQ MAC/DOCSA. This manual is scheduled for release on 1 Apr 1998.

ERNEST M. RIPLEY, GM-13
Chief, Base Logistics Mobility Branch
Directorate of Operations and Mobility Systems

Atch 5.4.1-1 Continued
Code and Test Procedures

Ref(s): Software Design Document (SDD)

	Identify and Evaluate Reusable Code Assets
	Identify the CSUs to be implemented by existing reusable software.
	Identify the CSUs which will become reusable software when implemented.
	Evaluate the reusable code assets to ensure the specified requirements will be satisfied by the proposed reusable code.

Ref(s): Design Documents

	Review Design and Requirements Documents
	Ensure Design and Requirements Documents to be reviewed include: SDD, IDD, SSDD, and DBDD.
	Ensure Design and Requirements Documents reflect any recent changes including outstanding action items from previous reviews.
	Ensure any changes to the Design and Requirements Documents are complete, consistent, unambiguous, feasible, codeable, testable, and traceable to the requirements.
	Update planning document(s), if needed.

	Develop Source Code
	Place source code under configuration management as specified by the Software Configuration Management paragraph of the SDP.
	Ensure effective programming methods are used to code the software (e.g. structured programming, code reuse, etc.)
	Ensure the sequence of code development considers factors such as criticality, difficulty, integration and test issues, and needs of the customer and end users, as appropriate.
	Ensure the requirements satisfied by the developed source code are traceable to the requirements matrix.
	Ensure source code is developed IAW with the Design Document(s) and the applicable references:
	Ada Programming Language (MIL-STD-1815A)
	DISA Technical Reference Model
	DISA, CIM Human Computer Interface Style Guide
	SSCR 700-10, Vol. I (Graphical User Interface Standards)
	AFM 171-100, Vol. I (Machine Independent ADS Standards)
	AFM 171-100, Vol. II (ADS Standards for H6000 Series ADS)
	AFM 171-100, Vol. V (ADS Standards for Systems on UNISYS ADP Hardware)
	AFM 171-100, Vol. VI (ADS Standards for Small Computers)
	AFM 171-100, Vol. VIII (ADS Standards for SMSCRC Systems)
	Accomplish Code and Test Work Reviews in form of structured walk-through(s) at intervals specified by the SDP.

Atch 5.4.1-1, Continued
Code and Test Procedures

	Generate Executables
	Place each executable under configuration management as specified in the Software Configuration Management paragraph of the SDP.

	Perform Testing in IAW Software Test Plans
	Review Software Test Plans, and perform Testing, Integrated Testing, and System Testing IAW the Software Test Plans.
	Insure the requirements and systemity specified by the design documents are satisfied.
	Update Software Test Plan and Software Test Descriptions as required.
	Compare any actual values to designed values for resources such as memory, processing time, communications, storage considerations, and other specified design parameters.

	Test Readiness Review (TRR) Question Set
	The questions below are an example of the questions that may be asked during a TRR: 1. What are the changes to the SW Requirements Specification (SRS) that have been approved and made since the SDR which impact CSCI testing?
	2. Were there any changes to the System/Segment Design Document (SSDD) or Database Design Document (SDD), since PDR and CDR which impact CSCI testing?
	3. What approved changes were made to the Software Test Plan (STP) and Software Test Description (STD), and how do they impact CSCI testing?
	4. What test procedures are to be used in conducting CSCI testing?
	5. What retest procedures are to be used for test anomalies and corrections?
	6. What CSC integration test cases, procedures, and results were used in conducting informal integration tests?
	7. What is the status of software test resources, i.e., test personnel, facility hardware, software, and materials?
	8. What are the limitations of all software tests?
	9. Have all software problems including all known discrepancies of the CSCI and test support software been identified and status provided?
	10. What are the remaining milestones schedules?
	11. Were all updates to the evolving documents; i.e., the Computer System Operator Manual (CSOM), Software User Manual (SUM), and Firmware Support Manual (FSM) accomplished?

Atch 5.4.2-1
Requirements Traceability Cross Reference Matrix

REQUIREMENTS TRACEABILITY CROSS REFERENCE MATRIX												
OCD Para	SSS Para	IRS Para	SSDD Para	SDD Para	IDD Para	CSCI XREF	SUBSYS SPEC PARA	PGM NAME	USER MANUAL REF	TEST ID NUMBER	TEST STEP	COMMENTS

Atch 5.4.2-2
Rapid Prototyping/Simulation

Overview

Prototyping is encouraged when requirements are uncertain. Prototyping is the best way to gain user buy-in and validate requirements. Use prototyping to produce a quick working model of a proposed system, when appropriate, using customer and analyst insight and interaction, experimentation, and demonstration. A basic system model can be built from initial customer specifications. The customer then responds to the demonstrated prototyped system. The prototyped system is modified accordingly and the customer again reviews for further refinement. This sequence is repeated until a satisfactory model is achieved. If the final prototyped version is functionally accurate and the software is constructed properly, it may be used as the production system. Remember that all artifacts called for in the entire software engineering process must be accomplished **(*See Figure 5.4.2-2*)**.

Procedures

The following table outlines the procedures for prototyping.

Procedures
a. During the Software Engineering Process Pre-Development Phase, all requirements should have already been analyzed. The following tasks should have been accomplished: (1) Determined that the project is feasible and should be attempted. A cost/benefit assessment is normally required to justify expenditure of resources on the project. (2) Examined alternatives and designed a practical approach for a solution. Developed a comprehensive problem and scope statement that established project boundaries, and coordinated with all customers. (3) Developed a plan for the project's growth. b. The Prototype process starts in the Software Engineering Process Development Phase. (System Requirements/Design; Software Requirements/Design) The objective of this phase is to perform a system requirements analysis and design the system and software. (1) The software analyst determines general system and software requirements and proposes a system design. The analyst also determines software requirements and proposes a software design, all based on preliminary fact-findings and experience. This phase describes an expanded list of functions, transactions, data elements, and customer procedural responsibilities. The objective is to get the model completed as soon as possible without the formalities of detailed format descriptions. (2) The customer's concurrence with the system proposal need only be a general agreement with the proposed procedural flow and that the system will most likely meet mission needs.

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Procedures, Cont'd

Procedures

(3) At this point, technical issues should be addressed. Consult with those who will code and maintain the production version of the system. Consider the programming language, file structures, protocols, and hardware assignments that will be required in the final production system. Surface and resolve possible problem areas that may occur during system construction.

(4) Build Prototype. Develop and test a baseline prototype model.

(5) Simulate the Prototype.

(a) Create a system environment to simulate the prototype. Use the simulation to ensure the prototype is comprehensive, accurate enough to be relied on, and functional enough to be useful. The simulation will allow you to analyze the system's performance and gain an understanding of the system's behavior. Timing and sizing issues must be resolved before the prototype is fielded. Specifically, the following dynamic attributes must be verified:

1. Interrupt handling and context switching,
2. Response times,
3. Data transfer rate and throughput,
4. Resource allocation and priority handling, and
5. Task synchronization and intertask communication.

(b) The simulation environment must be as close as possible to the target operational environment. Numerous tools (CASE, Simulation Control Language (SCL), mathematical models, etc.) are available to assist with the simulation process.

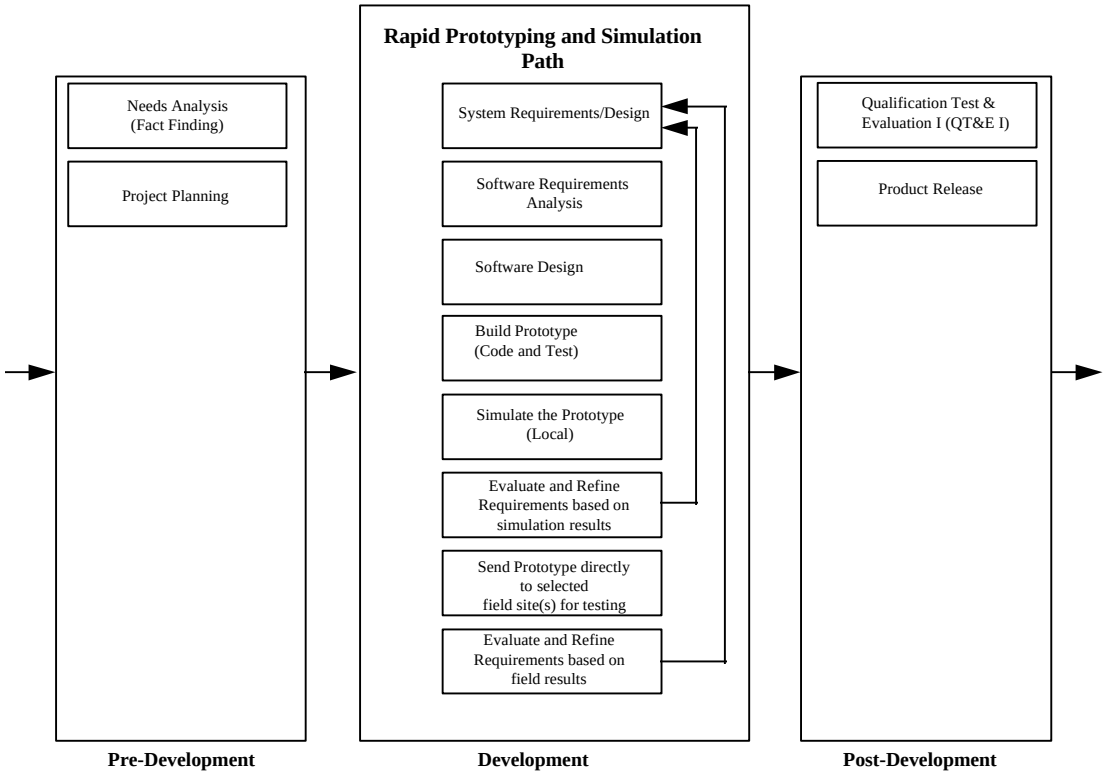
(6) Evaluate and refine requirements based on simulation results. The results of the simulation is reviewed and discussed with the customer. The customer will either refine, expand, or accept the results based on the requirements. Record all results and related changes to the functional scope of the prototype. Update all written descriptions of the prototype as applicable.

c. Send prototype system to selected field sites(s) for testing.

d. Evaluate and refine requirements based on field results. The results of field testing is reviewed and discussed with the customer. The customer will either refine, expand, or accept the prototype as meeting stated requirements. Record all results and related changes to the functional scope of the prototype. Update all written descriptions of the prototype as applicable. ***Once field testing of the prototype is satisfactory, a final package should be delivered to SSQ for formal test and release.***

Figure 5.4.2-2

Outline The following diagram illustrates the Rapid Prototyping and Simulation path for the SEP.



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Atch 5.4.2-3
Security Documents

(Documents are being developed by security at time of this printing.
Contact Security office SSC/RMMS/6-4114.)

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6.0

The Post-Development Phase

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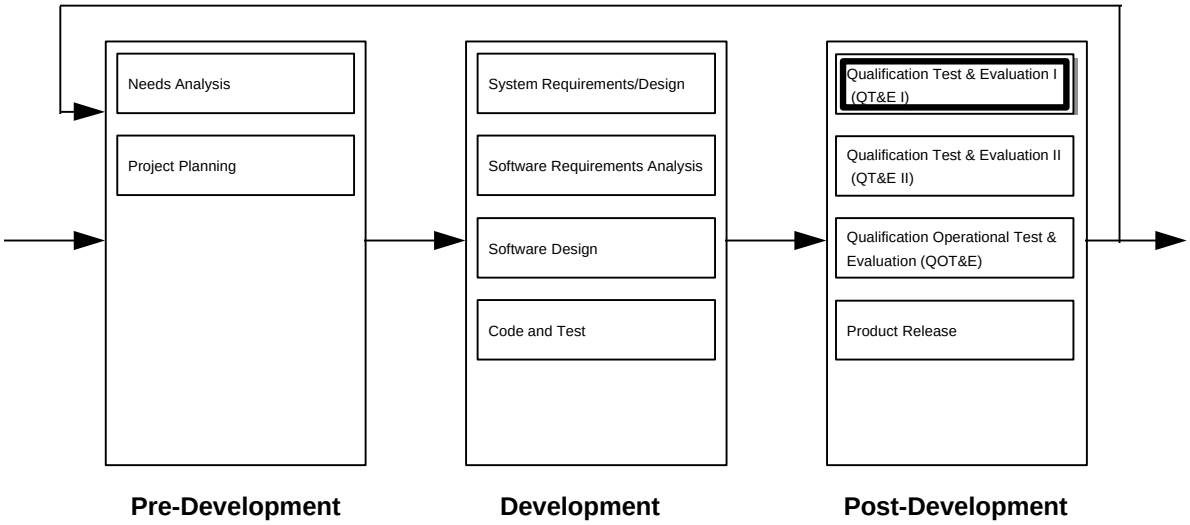
6.1 Qualification Test & Evaluation I: Overview

Purpose

To test computer software and review documentation by an independent test group before operational release. Testing includes the interaction of multiple software systems residing on a single or multiple hardware platform(s).

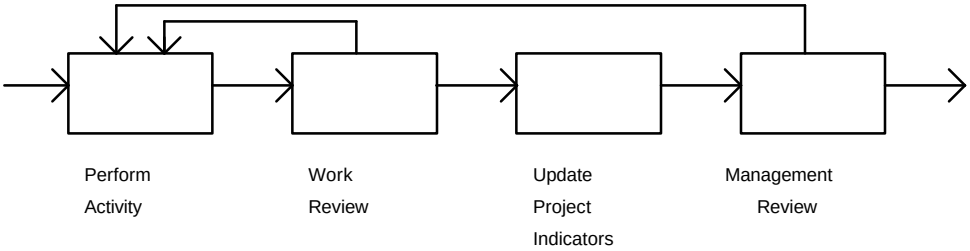
Where We Are

This diagram illustrates where the Qualification Test & Evaluation I process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete the Qualification Test & Evaluation I process.



In This Section The specific Qualification Test & Evaluation I stages will be covered in the following sections.

QT & E I Stages	Section
Perform Activity	6.1.1
Work Review	6.1.2
Update Project Indicators	6.1.3
Management Review	6.1.4

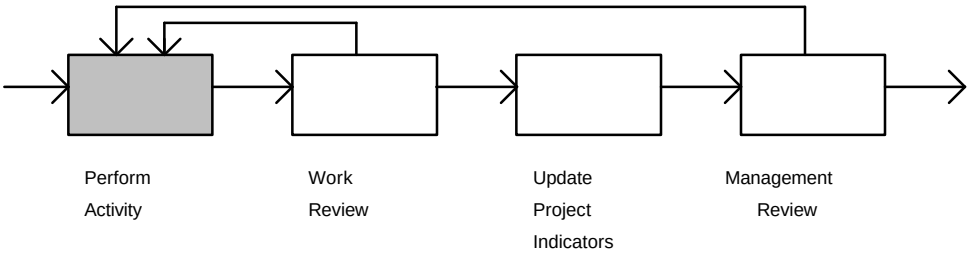
6.1.1 Qualification Test & Evaluation I: Perform Activity

Purpose

To independently verify the software function, performance and reliability requirements and the adequacy of the documentation.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	All of the Turn-In activity requirements have been accomplished.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Software Development Plan	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.
Computer Center Software Operator Manual	Tells computer center personnel how to operate software that will run in that environment
Software Installation Plan	Describes plans for installing software at user sites, training users, and converting from old systems.
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Security Certification Letter	An endorsed letter certifying the integrity of the software.
Software	Software program(s) to be tested
Software Test Description	Provides test cases/procedures for testing
Software User Manual	Tells a hands-on user how to operate the software
Software Test Plan	Provides high-level planning for testing
Test Data	Input data, databases, etc., to be used for verification testing.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Test Preparation	Ensure all necessary software/documentation is available for the test.	Atch 6.1.1-2 (Page 6-347)
Test the Software	Follow software test plan	Atch 6.1.1-2
Evaluate Documentation	Evaluate the software and support documentation.	Atch 6.1.1-2
Software Test Report	Complete software test report	Atch 6.1.1-2

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Support Offices	Ensure schedule feasibility considering the availability of skills, tools, and hardware.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).
System Coordinator	Project Office individual who will be available during the testing cycle to respond to test results.

Product Summary

The following products are produced in this stage.

Product	Description
Security Certification Letter	An endorsed letter certifying the integrity of the software.
Software Test Report	Describes the results of integration, software system, or other system testing

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Errors Detected	Number of Errors and Recycles
Hours Expended	Track number of hours in testing
Resources	Track amount of resources spent in testing

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	The testing and Software Test Report have been successfully completed.

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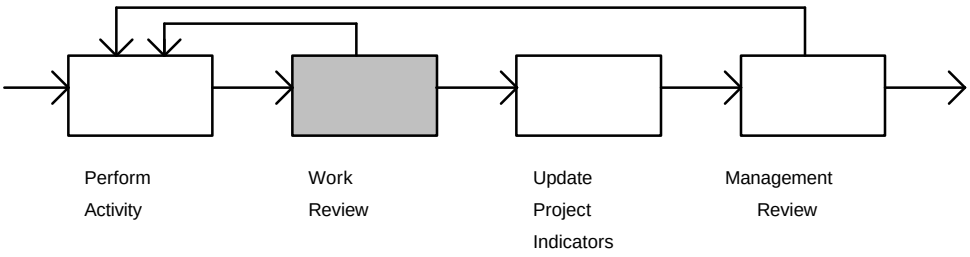
6.1.2 Qualification Test & Evaluation I Work Review

Purpose

To ensure test and evaluation was conducted in accordance with the software test plan and to assess the results.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Software Installation Plan	Describes plans for installing software at user sites, training users, and converting from old systems.
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Security Certification Letter	An endorsed letter certifying the integrity of the software.
Software Test Description	Provides test cases/procedures for testing
Software Test Plan	Provides high-level planning for testing
Software Test Report	Describes the results of integration, software system, or other system testing
Computer Center Operator Manual	Tells computer center personnel how to operate software that will run in that environment
Software User Manual	Tells a hands-on user how to operate the software

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Present material for review
Functional OPR	Represents functional viewpoint
Review Panel	Reviews material
Support OCRs	Support review panel, as needed, on specific items
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Technical Risks	Risks identified during the review.
Review Defect Report	Defects identified during the review.
Review Action Items	Action items taken during the review.
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).
Review Recommendation	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Track number of hours in the Work Review.

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Review Panel...	THEN...
Approves Technical Content	Project proceeds to the Qualification Test & Evaluation I Update Management Indicators stage.
Disapproves Technical Content	Project returns to the Qualification Test & Evaluation I Perform Activity stage.

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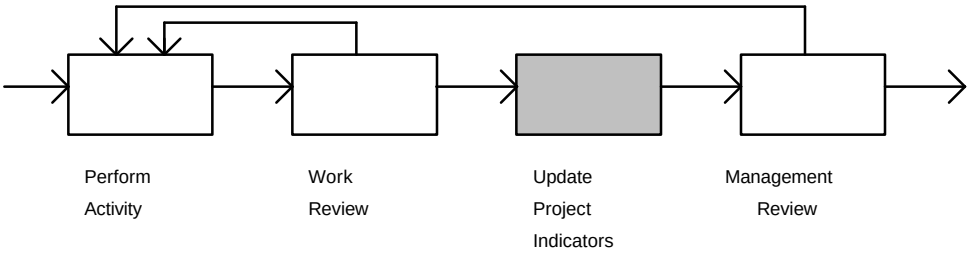
6.1.3 Qualification Test & Evaluation I: Update Project Indicators

Purpose

To update project indicators to show the impact of test results.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	All software testing has been technically reviewed and approved.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Software Test Plan	The plan for conducting the testing
Software Test Report	Describes the results of integration, software system, or other system testing

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-48)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Has responsibility and overall authority for the software/documentation.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).
Support Offices	Provide support as requested by (Project Officer) or Program Manager.

Product Summary

The following products are produced in this stage.

Product	Description
Cost Estimate	Revised cost estimate
Schedule Estimate	Revised schedule estimate

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	The actual number of hours spent on QT&E I.
Resources	The actual resources consumed in this testing.

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.

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6.1.4 Qualification Test & Evaluation I: Management Review

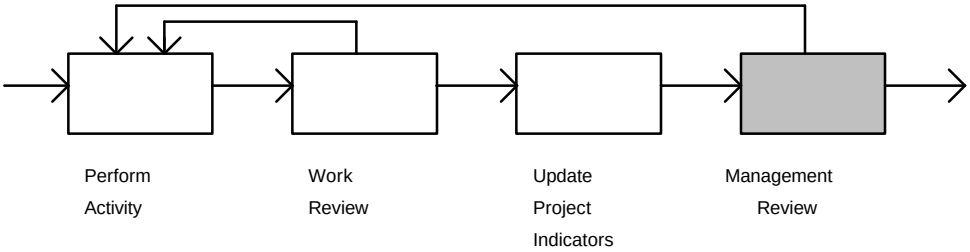
Purpose

The purpose of this review is to:

1. Provide management visibility.
2. Assess the impact of test and evaluation.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	The software testing has been conducted, technically reviewed, and project indicators updated.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Cost Estimate	Revised cost estimate
Schedule Estimate	Revised schedule estimate
Software Test Report	Describes the results of integration, software system, or other system testing
Review Recommendation	Review panel's recommendation to Approval Authority
Work Review Action Items	Deficiencies/corrective actions and other action items resulting from the Work Review
Work Review Minutes	Minutes describe the technical issues raised during the review

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Any changes that need to be made to the baseline must be identified, evaluated, assessed for risk, documented, planned, communicated to the affected groups or individuals and tracked to completion. The changes must be reprocessed through the Needs Analysis phase. - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove.
Project Office	Present review material to management.
Review Panel	Assist Management in the decision process.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Review Action Items	Action Items taken during the review.	F
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).	F
Approval Authority's Continuation Decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	F

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Hours expended in conducting the review
Action Items	Number of action items assigned by the Approval Authority

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Approval Authority ...	THEN ...
Approves Continuation	The software/documentation package is tested and prepared for subsequent release.
Disapproves Continuation	The software/documentation package is recycled to bring it up to minimum standards.
Cancels Project	Refer to Cancellation process (see Appendix H).

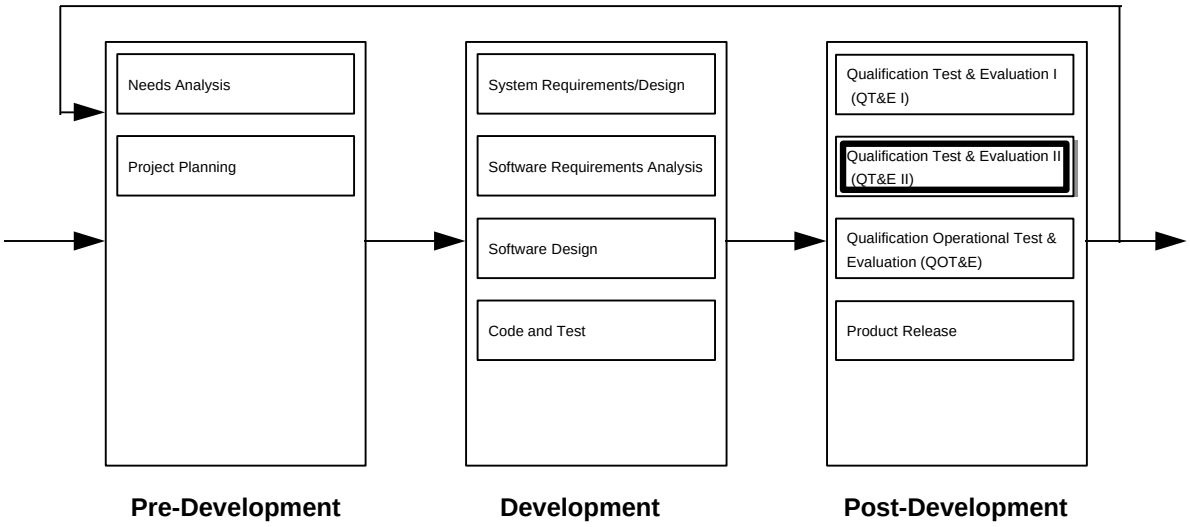
6.2 Qualification Test & Evaluation II: Overview

Purpose

To conduct formal testing in a "live" environment at one or more selected Air Force operational sites before release for operational use.

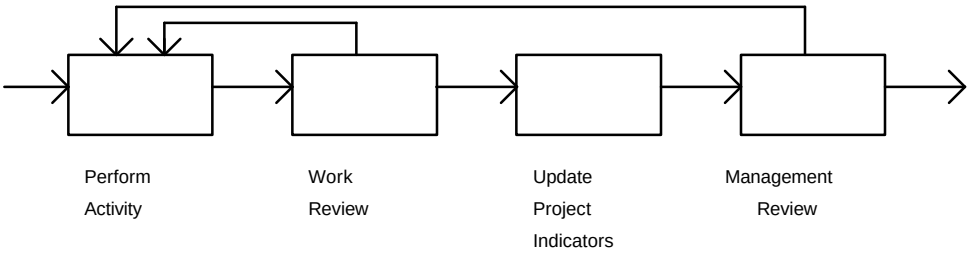
Where We Are

This diagram illustrates where the Qualification Test & Evaluation II process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete the Qualification Test & Evaluation II process.



In This Section

The specific Qualification Test & Evaluation II stages will be covered in the following sections.

QT & E II Stages	Section
Perform Activity	6.2.1
Work Review	6.2.2
Update Project Indicators	6.2.3
Management Review	6.2.4

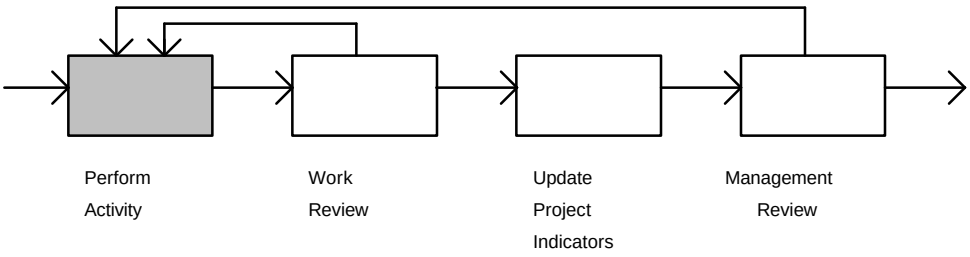
6.2.1 Qualification Test & Evaluation II: Perform Activity

Purpose

To conduct formal testing of computer software in a "live" environment at one or more selected sites before release for world-wide use.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	QT&E I has been accomplished.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Software Development Plan	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.
Authorization	Message coordinated among all affected agencies clearly authorizing the test and defining responsibilities and obligations.
Computer Center Software Operator Manual	Tells computer center personnel how to operate software that will run in that environment
Software Installation Plan	Describes plans for installing software at user sites, training users, and converting from old systems.
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Software	Software program(s) to be tested
Software Test Description	Provides test cases/procedures for testing
Software User Manual	Tells a hands-on user how to operate the software
Software Test Plan	Provides high-level planning for testing

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Test Preparation	Ensure all necessary software/ documentation is available for the test. Personnel are selected and responsibilities determined.	Atch 6.2.1-1 (Page 6-359)
Select AF Sites	Select a site or number of sites that best represent the field environment for which the requirements were written commensurate with all necessary coordination and qualifications.	Atch 6.2.1-1
Provide Sites Test Material	Test-sites are provided the software and/or documentation to be used. Inform the participants of what is expected of them, how they can receive assistance, and when reports are due.	Atch 6.2.1-1
Evaluate Documentation	Test sites evaluate the software and support documentation.	Atch 6.2.1-1
Software Test Report	Complete software test report as appropriate.	Atch 6.2.1-1

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Site Test Team	Team that will support the test site.
Project Office	Perform activities associated with this stage.
Support Offices	Provide support as requested by Project Officer.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Software Test Report	Describes the results of integration, software system, or other system testing

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Errors Detected	Number of Errors and Recycles
Hours Expended	Number of hours in testing
Resources	Track amount of resources spent in testing

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	Successfully completed the testing and Software Test Report

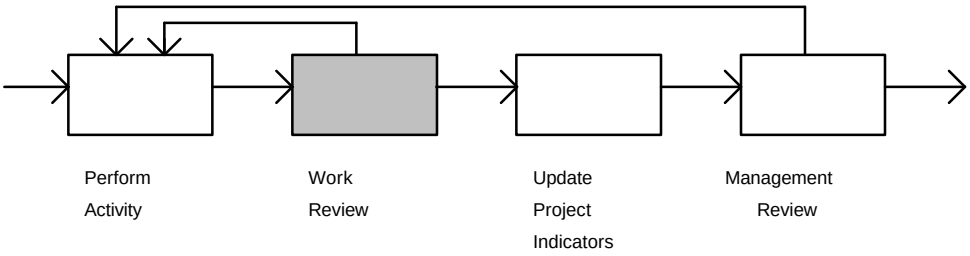
6.2.2 Qualification Test & Evaluation II Work Review

Purpose

To ensure test and evaluation was conducted in accordance with the software test plan and to assess the results.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Software Installation Plan	Describes plans for installing software at user sites, training users, and converting from old systems.
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Software Test Description	Provides test cases/procedures for testing
Software Test Plan	Provides high-level planning for testing
Software Test Report	Describes the results of integration, software system, or other system testing
Computer Center Operator Manual	Tells computer center personnel how to operate software that will run in that environment
Software User Manual	Tells a hands-on user how to operate the software

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Present material for review
Functional OPR	Represents functional viewpoint
Review Panel	Reviews material
Support OCRs	Support review panel, as needed, on specific items
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Technical Risks	Risks identified during the review.
Review Defect Report	Defects identified during the review.
Review Action Items	Action items taken during the review.
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).
Review Recommendation	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Track number of hours in the Work Review.

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Review Panel...	THEN...
Approves Technical Content	Project proceeds to the Qualification Test & Evaluation II Update Management Indicators stage.
Disapproves Technical Content	Project returns to the Qualification Test & Evaluation II Perform Activity stage.

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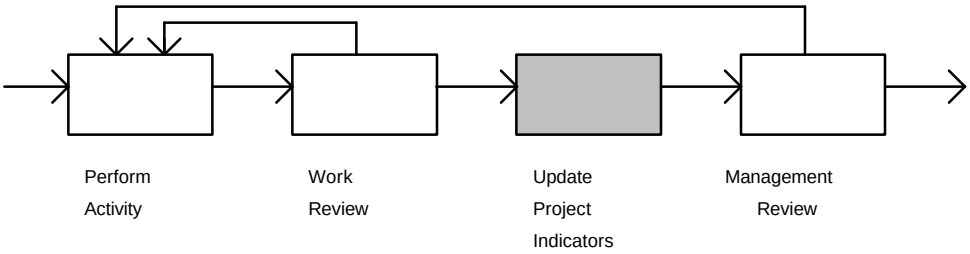
6.2.3 Qualification Test & Evaluation II: Update Project Indicators

Purpose

To update project indicators to show the impact of test and evaluation results.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	All software testing has been technically reviewed and approved.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Software Test Plan	The plan for conducting the testing
Software Test Report	Describes the results of integration, software system, or other system testing

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-48)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Has responsibility and overall authority for the software/documentation.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).
Support Offices	Provide support as requested by (Project Officer) or Program Manager.

Product Summary

The following products are produced in this stage.

Product	Description
Cost Estimate	Revised cost estimate
Schedule Estimate	Revised schedule estimate

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	The actual number of hours spent on QT&E II.
Resources	The actual resources consumed in this testing.

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.

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6.2.4 Qualification Test & Evaluation II: Management Review

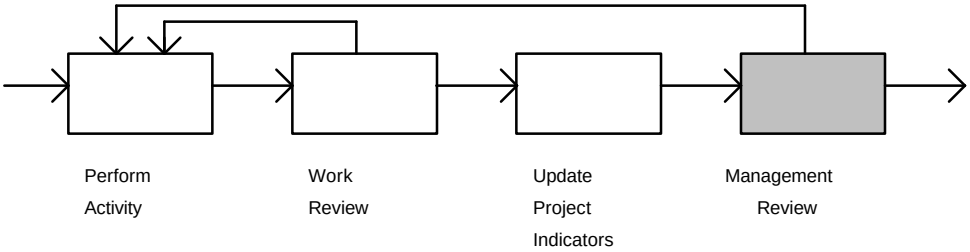
Purpose

The purpose of this review is to:

1. Provide management visibility.
2. Assess the impact of test and evaluation.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	The software design have been defined, analyzed, reviewed, and documented.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Cost Estimate	Revised cost estimate
Risk assessment	Identified risks and Program Manager's assessment/recommendation
Schedule Estimate	Revised schedule estimate
Software Test Report	Describes the results of integration, software system, or other system testing
Work Review Action Items	Describe the action items needed to be performed
Work Review Minutes	Minutes describe the technical issues raised during the review

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Any changes that need to be made to the baseline must be identified, evaluated, assessed for risk, documented, planned, communicated to the affected groups or individuals and tracked to completion. The changes must be reprocessed through the Needs Analysis phase. - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove.
Project Office	Present review material to management.
Review Panel	Assist Management in the decision process.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Review Action Items	Action Items taken during the review.	F
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).	F
Approval Authority's Continuation Decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	F

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Hours expended in conducting the review
Action Items	Number of action items assigned by the Approval Authority

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Approval Authority ...	THEN ...
Approves Continuation	The software/documentation package is tested and prepared for subsequent release.
Disapproves Continuation	The software/documentation package is recycled to bring it up to minimum standards.
Cancels Project	Refer to Cancellation process (see Appendix H).

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6.3 Qualification Operational Test & Evaluation: Overview

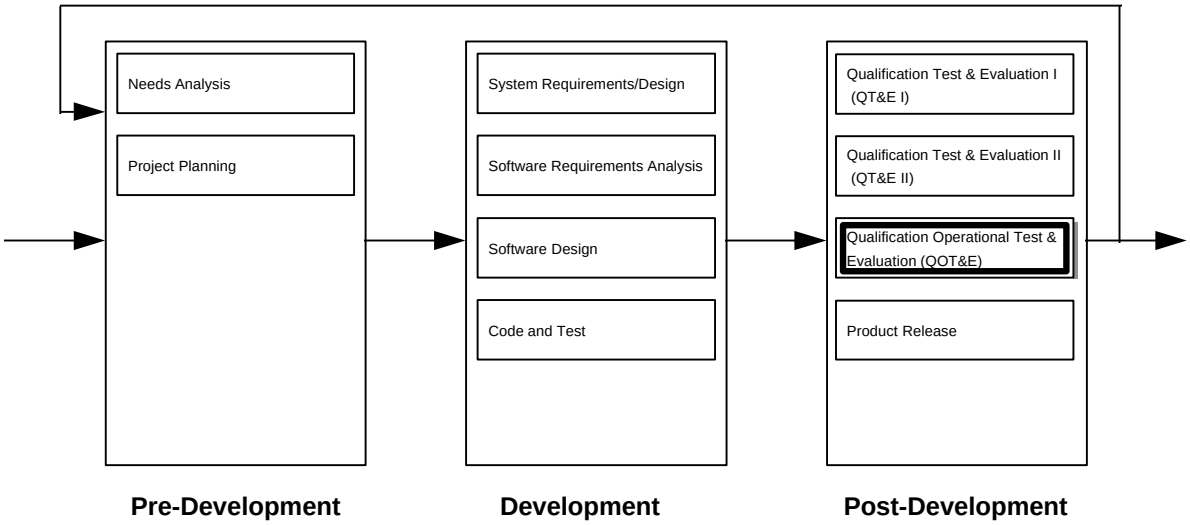
Purpose

To ensure that only operationally effective and suitable systems are delivered to the operating forces (AFR 80-14, para 14). To also ensure that new systems meet user requirements and operate within their planned operational and maintenance concepts (AFR 55-43, para 1-1). AFOTEC testing is normally done for new systems only.

NOTE: QOT&E is accomplished by the Air Force Operational Test and Evaluation Center (AFOTEC). Their procedures and practices are not governed by SSC. Organizations which are involved in QOT&E are supported by Quality Assurance (SSQ) much in the same way any other field site is supported except that releases made to these sites are usually handled as "emergency" releases to expedite support.

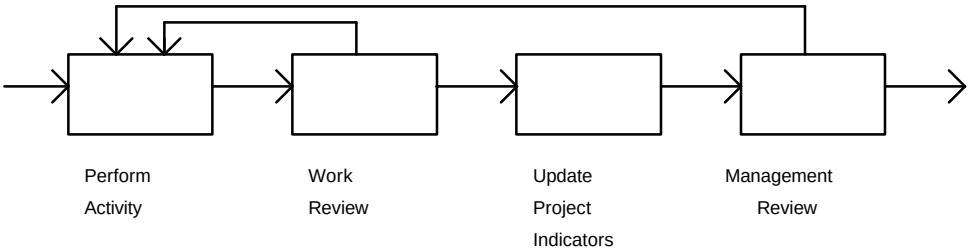
Where We Are

This diagram illustrates where the Qualification Operational Test & Evaluation process fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete the Qualification Operational Test & Evaluation process.



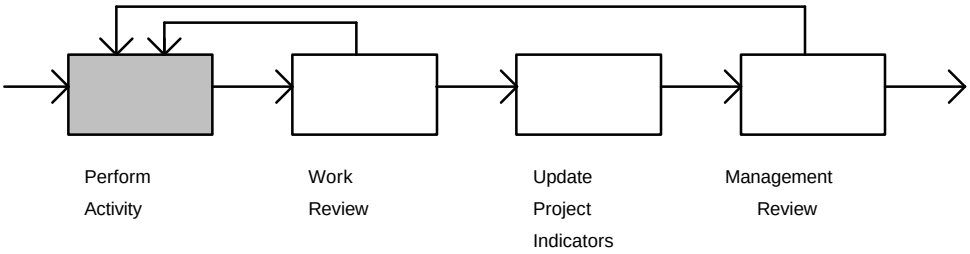
In This Section The specific Qualification Operational Test & Evaluation stages will be covered in the following sections.

QOT&E Stages	Section
Perform Activity	6.3.1
Work Review	6.3.2
Update Project Indicators	6.3.3
Management Review	6.3.4

6.3.1 Qualification Operational Test & Evaluation: Perform Activity

Purpose To Support Qualification Operational Test and Evaluation by AFOTEC

Diagram This diagram shows the context for this stage.



Entry Criteria Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	The Test and Evaluation Master Plan must be approved.
	The Qualification Operational Test & Evaluation Plan must be approved.
	The Test Resource Plan must be approved.
	Qualification Test and Evaluation (I and/or II) must be complete.
	Functional Qualification Review must be complete.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Software Development Plan	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.
Operational Requirements Document	A document prepared by the respective using command describing performance, operation, support, characteristics, and the requirements for a specific candidate system.
Test and Evaluation Master Plan	The TEMP integrates critical issues, test objectives, evaluation criteria, system characteristics, responsibilities, resources, and schedules for QOT&E.
Qualification Operational Test and Evaluation Plan	The document prepared by QOT&E agency (usually AFOTEC) that details the background, scope, and procedures for conducting the QOT&E.
Test Resource Plan	The basic resource management document used throughout the QOT&E planning process. Identifies resources required to support testing; is the basis for budget submissions, and manpower plans prepared by AFOTEC.
Test Limitations	Provided by the project office to describe unique situations and limitations relevant to this test.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Chair the Test Plan Working Group (TPWG)	Resolve test-related issues	Atch 6.3.1-1 (Page 6-cccLxv)
Chair the Joint Reliability and Maintainability Evaluation Team (JRMET)	• Hold JRMET meeting during the test to make sure the data being collected is correct • Resolve any test-related R&M issues during testing • Hold a JRMET meeting at the end of the test to review all PQDRs (held at the test site)	Atch 6.3.1-1
Chair the Material Improvement Project (MIP) Review Board (MRB)	• SPO assigns MIP number to valid PQDRs • Manages resolution of MIPs • Manages classification and resolution of PQDRs • Reviews prioritized PQDR list for agreement • Recommends closure of MIPs • Update and distribute MIP Status Report	Atch 6.3.1-1
Provide Membership on the Test Data Scoring Board	• Government-only held in conjunction with the JRMET • Compiles and scores R&M data after JRMET review	Atch 6.3.1-1

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Chair TPWG, JRMET, MRB, provide membership on TDSB Support AFOTEC during QOT&E
AFOTEC	Conduct QOT&E, chair TDSB, provide membership on TPWG, JRMET, and MRB
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).
Functional OPR	Support QOT&E test, possibly with test team members; Provide membership on TDSB, TPWG, JRMET, and MRB

Product Summary

The following products are produced in this stage.

Product	Description
Program Quality Discrepancy Reports (PQDR)	Provides information for both deficiencies and proposed enhancements on operational and logistics supportability of new systems or equipment during all phases of QOT&E (TO 00-35D-54).
Material Improvement Project (MIP)	A MIP is established when a deficiency or enhancement is determined to warrant further investigation and is used to monitor and control all actions related to it (TO 00-35D-54).
MIP Status Report	Tracks MIP/PQDR status. May be manual or automated (e.g. INFOCEN at WPAFB OH). It is updated at least monthly and send copies to the PQDR originator and other program participants.
QOT&E Report	The test team prepares the final QOT&E report to answer critical operational issues and present constraints and limitations, results, conclusions, and recommendations as an executive-level document to decision makers, planners, and operators.

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Track number of hours spent in QOT&E boards
Errors Detected	Number of PQDRs generated
Resources	Track amount of resources spent supporting QOT&E

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	The software and software test plans have been developed and documented.
	Project risks have been identified, documented, and their impact assessed.

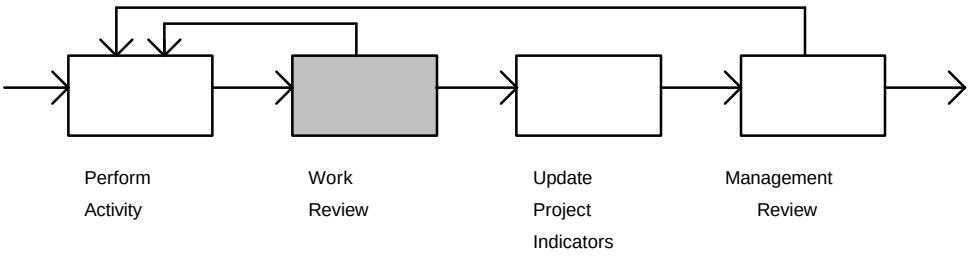
6.3.2 Qualification Operational Test & Evaluation Work Review

Purpose

To ensure test and evaluation was conducted in accordance with the software test plan and to assess the results.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	The program/project office has completed development of the source code.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Product Quality Discrepancy Reports (PQDR)	Provides information for both deficiencies and proposed enhancements on operational and logistics supportability of new systems or equipment during all phases of QOT&E (TO 00-35D-54).
Material Improvement Project (MIP)	A MIP is established when a deficiency or enhancement is determined to warrant further investigation and is used to monitor and control all actions related to it (TO 00-35D-54).
MIP Status Report	Tracks MIP/PQDR status. May be manual or automated (e.g. INFOCEN at WPAFB OH). It is updated at least monthly and send copies to the PQDR originator and other program participants.
QOT&E Report	The test team prepares the final QOT&E report to answer critical operational issues and present constraints and limitations, results, conclusions, and recommendations as an executive-level document to decision makers, planners, and operators.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Present material for review
Functional OPR	Represents functional viewpoint
Review Panel	Reviews material
Support OCRs	Support review panel, as needed, on specific items
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Technical Risks	Risks identified during the review.
Review Defect Report	Defects identified during the review.
Review Action Items	Action items taken during the review.
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).
Review Recommendation	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Track number of hours in the Work Review.

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Review Panel...	THEN...
Approves Technical Content	Project proceeds to the Qualification Operational Test & Evaluation Update Management Indicators stage.
Disapproves Technical Content	Project returns to the Qualification Operational Test & Evaluation Perform Activity stage.

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6.3.3 Qualification Operational Test & Evaluation: Update Project Indicators

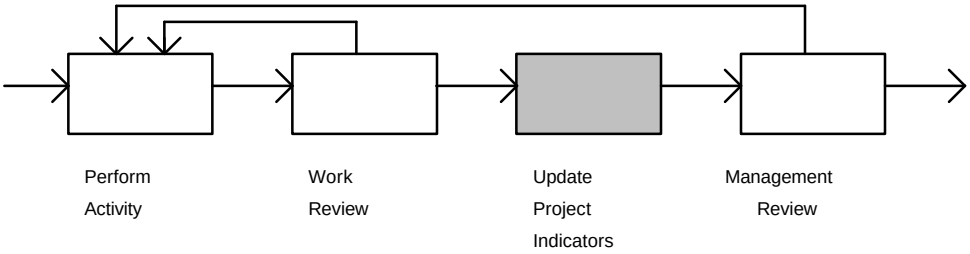
Purpose

The purpose of this process is to:

1. Update project management indicators - Cost and Schedule.
2. Evaluate project risk and assess impact.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	All software and software test plans have been developed and reviewed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Review Defect Report	Defects identified during the review.
Review Action Items	Action items taken during the review.
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).
Review Recommendation	Review panel recommendation on technical suitability of material presented.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Estimate Size, Schedule, and Cost	Update estimates. All projects requiring a cost estimate should contact SSC/RMF for assistance and approval procedures. Monitor actual size, cost, effort, schedule, and risks of the project and compare with those previously planned. If corrective action is required, you must either increase performance or replan the project. - If the project is reworked, reaccomplish the Needs Analysis and Project Planning phase activities. If *no* corrective action is required, update the historical database for future project planning activities.	Atch 4.1.3-1 (Page 4-48)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Responsible for updating Project Indicator.
Support Offices	Provide support to the Project Office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Cost Estimate	Revised cost estimate
Schedule Estimate	Revised schedule estimate

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	The actual number of hours spent on QOT&E.
Resources	The actual resources consumed in this testing.

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.

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6.3.4 Qualification Operational Test & Evaluation: Management Review

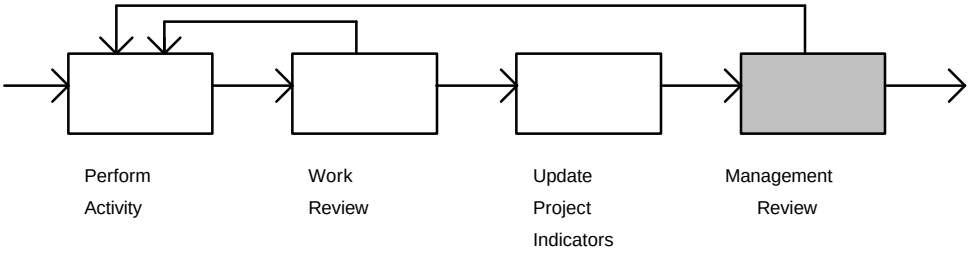
Purpose

The purpose of this review is to:

1. Provide management visibility.
2. Approve/disapprove the software.
3. Review revised project size, cost, and schedule estimate.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	Project cost and schedule estimates have been revised.
	Project risks have been analyzed and their impact assessed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Cost Estimate	Revised cost estimate
Review Recommendation	Review panel's recommendation to Approval Authority
Risk assessment	Identified risks and Program Manager's assessment/recommendation
Schedule Estimate	Revised schedule estimate
Security Certification Letter	An endorsed letter certifying the integrity of the software.
Software Test Report	Describes the results of integration, software system, or other system testing
Work Review Action Items	Deficiencies/corrective actions and other action items resulting from the Work Review
Work Review Minutes	Minutes describe the technical issues raised during the review

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove.
Project Office	Present review material to management.
Review Panel	Assist Management in the decision process.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Review Action Items	Action Items taken during the review.	F
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).	F
Approval Authority's Continuation Decision	Approval Authority's decision to approve/disapprove or cancel continuation of the project.	F

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Categorized by: - Project Office Preparation - Reviewer Preparation - Conduct of the Review
Action Items	Number of action items assigned by the Approval Authority

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Approval Authority ...	THEN ...
Approves Continuation	The software/documentation package is prepared for subsequent release.
Disapproves Continuation	The software/documentation package is recycled to bring it up to minimum standards.
Cancels Project	Refer to Cancellation process (see Appendix H).

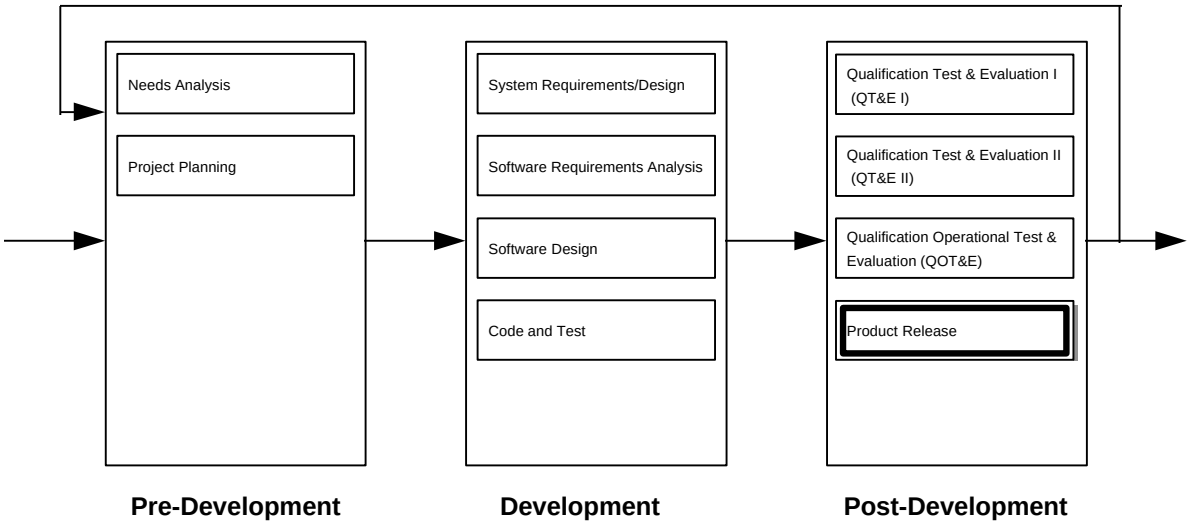
6.4 Product Release: Overview

Purpose

To release the software and/or documentation to all affected sites.

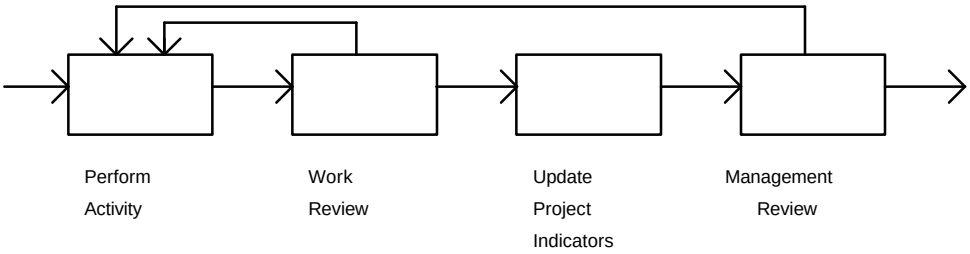
Where We Are

This diagram illustrates where the Product Release fits in relation to the overall software engineering process.



Stages to Follow

This diagram delineates the 4 stages required to complete the Product Release process.



In This Section

The specified Product Release stages will be covered in the following sections.

Release Stages	Sections
Perform Activity	6.4.1
Work Review	6.4.2
Update Indicators	6.4.3
Management Review	6.4.4

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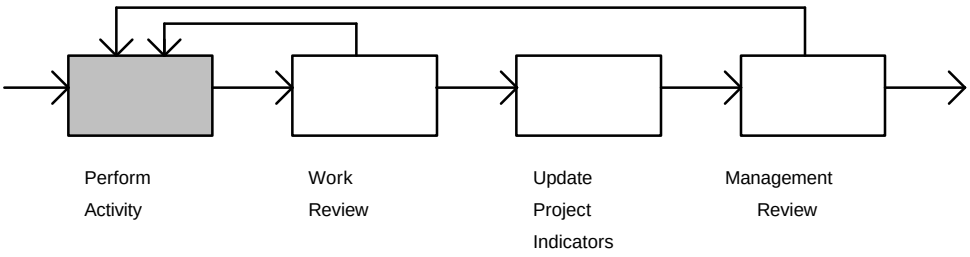
6.4.1 Product Release: Perform Activity

Purpose

The purpose of this stage is to provide to the user software/documentation that meets the requirement specifications and has passed all required testing.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	The release has been tested, prioritized, documented, and packaged.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Software Development Plan	A description of plans for conducting a software development effort. The term "development" in this DID is meant to include creating new items, incorporating existing items, updating or refining existing items, or a combination of these approaches.
Software Test Report	Describes the results of integration, software system, or other system testing
Cover Letter	Draft letter describing rationale and authority for release.
Special Instructions	Instructions necessary to assist in loading the software but not appropriate for inclusion in the User's manual, Installation Procedures, or other standard documentation.
Distribution List	A list where the software will be sent.
Software and documentation	The application software and documentation to be released.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Merge software	Assemble all software elements and place on media appropriate for the system environment.	Atch 6.1.1-1 (Page 6-338)
Copy software	Make sufficient copies of media to support release requirement.	Atch 6.1.1-1
Print documentation	Print sufficient quantities of supporting documentation to support release requirement.	Atch 6.1.1-1
Prepare Cover Letter	Coordinate, sign, and print cover letter in sufficient quantities to support the release requirement.	Atch 6.1.1-1
Assemble components	Assemble the above components and inventory them to ensure the requirement can be met.	Atch 6.1.1-1

Roles and Responsibilities

This table outlines the organizational roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
SSQ	Assemble all components for release, ensure everything is present and documented, and ship the release.
Support Offices	Provide all necessary components.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent. All appropriate documentation is attached.
Software Installation Plan	Describes plans for installing software at user sites, training users, and converting from old systems.
Software (Tapes, Diskettes, etc.)	Product Certification Baseline

Measurement This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Track number of hours and resources expended in the preparation on the release. Hours should be tracked by a predefined category.
Resources & estimate shipping cost	Track amount of resources spent in the preparation of the release.
Number of software elements released	The number of applications and components software elements on the release
Number of pages of Documentation	The number of pages of documentation released by application and the total.

Exit Criteria Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	All software and supporting documentation is tested, as appropriate, assembled, packaged, labeled and ready for shipment.

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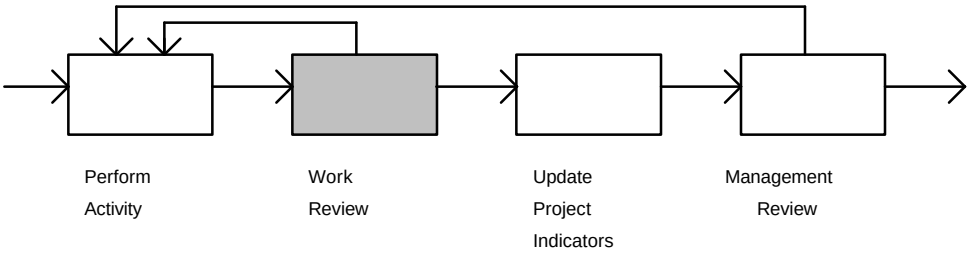
6.4.2 Product Release Work Review

Purpose

To ensure the project is technically ready to be released.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	A complete release package is assembled for shipment.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Release Document	Base Level Integrated Support System (BLISS) Output; AF Form 636 or functional equivalent
Security Certification Letter	An endorsed letter certifying the integrity of the software.
Software Test Report	Describes the results of integration, software system, or other system testing

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Project Office	Present material for review
Functional OPR	Represents functional viewpoint
Review Panel	Reviews material
Support OCRs	Support review panel, as needed, on specific items
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Technical Risks	Risks identified during the review.
Review Defect Report	Defects identified during the review.
Review Action Items	Action items taken during the review.
Review Minutes	Minutes of the review (Use AFCC Form 2212 if available).
Review Recommendation	Review panel recommendation on technical suitability of material presented.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Track number of hours in the Work Review.

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Review Panel...	THEN...
Approves Technical Content	Project proceeds to the Product Release Update Project Indicators stage.
Disapproves Technical Content	Project returns to Product Release Perform Activity stage.

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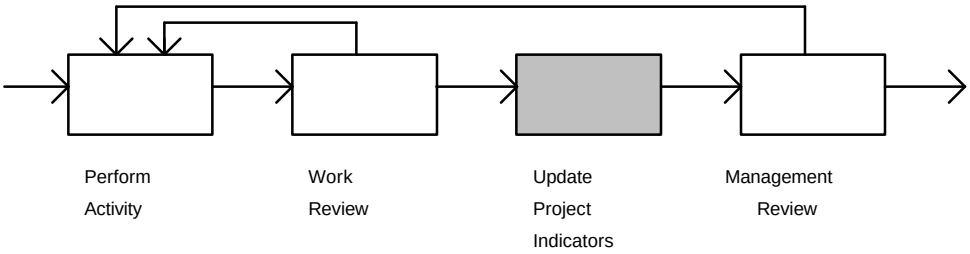
6.4.3 Product Release: Update Project Indicators

Purpose

To update project indicators reflecting the achievement of project release.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	Completion of Product Release Work Review.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Activities

The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Actual Cost	Record in the historical repository the final and actual project cost	Appendix B
Actual Schedule	Record in the historical repository the final and actual project schedule	Appendix B

Roles and Responsibilities

This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
SSQ	Update pertinent records to reflect actual status.
Support Offices	Provide information and materials to project office.
Software Process Assurance Group (SPA)	Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage.

Product	Description
Shipping Cost	Costs for shipping
Shipping Schedule	Planned verses actual
Cost and amount of materials used	Used to plan future shipment expenses and economic order quantity of materials used.
Hours Expended to pack and ship	Effectiveness of resource utilization.
DIREPS/SANs cleared	The number of Difficulty Reports and System Advisory Notices cleared by this release.
Number of elements, pages of documentation.	The number of programs and total pages of documentation contained in this release.

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Estimate Schedule	Update schedule estimate
Estimate Cost	Update cost estimate

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

✓	Exit Criteria
	Project size, cost, and schedule estimates have been revised, and compared against those previously planned. Required corrective action(s) has been taken.

6.4.4 Product Release: Management Review (Release Review)

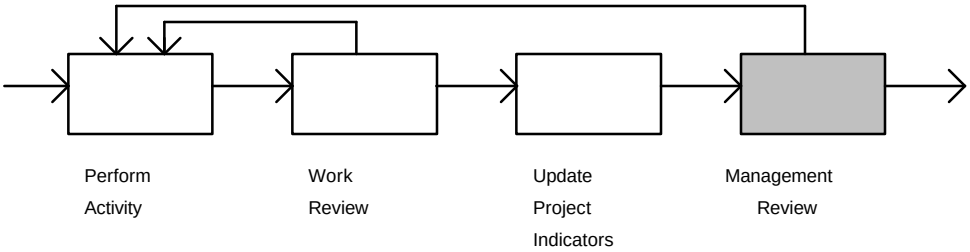
Purpose

The purpose of this review is to:

1. Provide management visibility.
2. Assess the readiness for release.

Diagram

This diagram shows the context for this stage.



Entry Criteria

Before activities in this stage can be initiated, the following entry criteria must be satisfied:

✓	Entry Criteria
	Release cost and schedule estimates have been revised.
	Release risks have been analyzed and their impact assessed.
	Funding and resources have been allocated.
	All software artifacts listed below in the input summary have been completed.

Input Summary

The following inputs are required for this stage.

Input	Description
Release Schedule	Steps and times necessary to complete release.
Review Recommendation	Review panel's recommendation to Approval Authority
Risk assessment	Identified risks and Program Manager's assessment/recommendation
Security Certification Letter	An endorsed letter certifying the integrity of the software.
Work Review Issues	Corrective actions taken to ensure quality release package.
Work Review Minutes	Documentation of actions taken to make release shipment.

Activities The following activities are performed during this stage.

Activity	Associated Tasks	See Procedures
Review Preparation	Notify Review Participants Develop Review Package - Agenda - Review Material - Review Checklist - Review Approval Criteria Distribute Review Package Incorporate/Record review participant comments	Appendix A (Page A-10)
Conduct the Review	As a minimum, review the material in the Input Summary.	Appendix A (Page A-14)
Review Follow-up	Document, track, address, and publish - Review minutes - Any changes that need to be made to the baseline must be identified, evaluated, assessed for risk, documented, planned, communicated to the affected groups or individuals and tracked to completion. The changes must be reprocessed through the Needs Analysis phase. - Approval/disapproval decision	Appendix A (Page A-15) Atch 6.1.1-3 (Page 6-347)

Roles and Responsibilities This table outlines the organization roles and responsibilities needed to support the activities performed in this stage.

Role	Responsibility
Management (Approval Authority)	Preside, Approve/Disapprove.
SSQ	Present review material to management.
Review Panel	Assist Management in the decision process.
Software Process Assurance Group (SPA)	Monitor the review. Ensure all activities and tasks associated with this stage are performed IAW the SPA plan (see Appendix I).

Product Summary

The following products are produced in this stage. An 'I' or 'F' in the CM column reflects that the product is placed under informal or formal configuration control at this time. Changes to these products must be accomplished according to documented SSC configuration management policies and/or procedures.

Product	Description	CM
Approval Authority's Continuation Decision.	Signed cover letter of Approval Authority's decision to approve/disapprove the release product.	F

Measurement

This is a minimum set of measurements to collect.

Type	Measurement
Hours Expended	Hours expended in conducting the review
Action Items	Number of action items assigned by the Approval Authority

Exit Criteria

Upon completion of the activities defined in this stage and before the initiation of activities in the next stage, the following exit criteria must be satisfied:

IF Approval Authority ...	THEN ...
Approves Continuation	The release product proceeds to the operational sites for implementation. Enhancement requests and error reports from operational sites will proceed to the Needs Analysis Process in the Pre-Development Phase. For release to QOT&E, proceed to paragraph 6.3 (Page 6-299).
Disapproves Continuation	The product proceeds to the appropriate phase, process, and stage as directed by the approval authority.
Cancels Project	Refer to Cancellation process (see Appendix H).

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Attachments

Atch 6.1.1-1
Turn-In and Release Procedures

Purpose This attachment defines the procedures and process used to release automated data systems (ADS) software, documentation, and data.

Ref(s): Adapted from SSCR 700-4, Vol II para 3-14 & atch 10, 30 Oct 1987, change 1.

✓	Item
	1. **Purpose**. This chapter defines the procedures and process used to release automated data system (ADS) software, documentation, and data from the Standard Systems Center (SSC).
	2. **General**: Releases made from SSC in support of standard systems will be accomplished IAW the procedures contained herein. These procedures are based on the fact that the Director of Quality Assurance is the sole releasing authority, and most releases will be made by this activity. Releases from other agencies within SSC will not be made without the written approval of the Director of Quality Assurance (SSC/SSQ). Letters requesting such approval must describe the proposed release approach, specifically addressing how the essential functions of the standard release process will be accommodated (i.e., elements to be released and method(s), configuration management controls, description of changes, change projections, and release schedules). The goal in Quality Assurance is to be responsive, provide the best possible support to all developers, and meet the needs of the field with timely, top-quality software and documentation.
	a. **Release Types**.
	(1) **Block**. This type of release is scheduled. It is used to support the Standard Base Level Computer (SBLC), the Comptroller Office of the Future (COOF), and the MAJCOM data processing centers. A block consists of the software and documentation for all of the individual systems that are scheduled for a given release, and have successfully undergone required testing and evaluation. These systems combined make up the block which is released to applicable SBLC, COOF, and Honeywell (MAJCOM) data processing centers. A routine precedence is always assigned to a block release. Any release package that is normally part of a block release, but because of some unique requirement must be handled differently, must be justified as a special release.
	(2) **Special**. A special release is for software/documentation that is normally part of a block (i.e., applicable to the SBLC, COOF, or Honeywell), but for one reason or another must deviate from the established block schedule. It is also used to support/correct a unique situation/problem at specified sites. Normally the processing time for this type of release is 1 to 30 days from the date the software and/or documentation is turned in to the date of shipment, depending on the amount of testing and editorial support required. Use of this type of release requires special justification and is supported when justified. There are other types of special releases which are described below.

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Atch 6.1.1-1, Continued
Turn-In and Release Procedures

✓	Item
	(a) **Minicomputer**. This type of release supports minicomputer systems i.e., System 11, Wang, Datapoint, 3B2, etc.). A release may consist of system and/or application software and documentation, depending on the release requirements. Processing time for a routine minicomputer release is 30 to 60 days from the date the software and/or documentation is turned in to the date of shipment, depending on the amount of testing required and editorial support. These releases should be scheduled when possible; however, out-of-cycle releases are supported when justified.
	(b) **Microcomputer**. This type of release supports microcomputer systems (i.e., Unisys PCs, Zenith, IBM, etc.). A release may consist of system and/or application software and documentation, depending on the release requirements. Processing time for a routine microcomputer release is 30 to 60 days from the date the software and/or documentation is turned in to the date of shipment, depending on the amount of testing required and editorial support. These releases should be scheduled when possible; however, out-of-cycle releases are supported when justified.
	(c) **Miscellaneous**. Logistics support only. This type of release is reserved for abnormal situations. (i.e., mail DIREPS to a contractor's facility, release source code, etc.). It is not for mailing equipment or correspondence. These items should be processed through the Transportation Management Office (TMO) or SSC/RM, as applicable. Depending on scope, the processing time for a miscellaneous release ranges from 1 to 30 days from the date the package is turned in to the date of shipment. Normally, these releases are turned in ready to ship; therefore, little delay is encountered with release processing.
	b. **Release Precedences**. Quality Assurance supervisors schedule work loads, direct testing, and process releases by taking into consideration the scope, complexity, resources, deadlines, and other parameters of the release. A priority scheme has been devised to provide a means to prioritize the work effort and is described below.
	(1) **ROUTINE**. This is the normal precedence given to any release. Any request that does not identify a precedence will be treated as a routine. Normally, Quality Assurance processes all routine requests on a first-in, first-out basis.
	(2) **PRIORITY**. This precedence is given to a release that does not necessarily require immediate attention but must be processed, shipped, and delivered earlier than would occur with a routine precedence. Use of this precedence, including the requirement of a specified ship date, must be justified.
	(3) **EMERGENCY**. This precedence is given to a release that must be processed and shipped as fast as possible to satisfy an emergency requirement. Some examples justifying an emergency release include a total computer system or automated data system failure resulting in the inability of one, multiple, or all bases to process payroll systems or launch aircraft; support software tests in the field when SSC individuals are on-site; and special projects directed by higher authority. All activities within the SSC must work together to ensure this type of critical requirement is satisfied immediately. If required, all routine and priority processing will cease until the emergency situation is resolved. An emergency precedence request must be thoroughly justified.

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Atch 6.1.1-1, Continued
Turn-In and Release Procedures

✓	Item
	c. **Electronic Distribution of Software**. Release Control now has the capability to send software electronically which creates a release tape at the receiving site. Currently this process is reserved for emergency precedence special releases sent to SBLC sites. This process can accommodate selected sites or a worldwide release and is determined on a case-by-case basis. The determining factors are urgency of need, numbers of sites, and number of tape blocks.
	d. **Release Schedules**. Effective planning is essential for the production, maintenance, and support of "quality" automated data systems. The time required and complexities involved with coordinating system interface changes, test and evaluation, and production and distribution of documentation require substantial lead times. Release Control will prepare and distribute a release schedule for the SBLC, COOF, and Honeywell systems.
	e. **Release Projections**. To inform and support the end user, some visibility on forthcoming changes, release projections will be provided. As a minimum, the release projections for the next scheduled release will be provided with the release currently being processed (i.e., Dec 92 release would include projections for the Apr 93 release). If additional projections can be made with a reasonable degree of confidence, this would be even better. For users of the SBLC and COOF systems, BLISS provides this capability (reference AFM 171-530 Volume I/II). We encourage the development and use of this type of automated capability on other systems; however, in the meantime, a manually prepared projection document will be used. This document must be clearly identified as a release projection document, identify the ADS, title and system code (i.e., Core Automated Maintenance System (CAMS), System Code FS), identify the applicable time frame(s), and include a meaningful description of what's to come. This projection document is to be part of the turn-in package.
	3. **Block Release Procedures**.
	a. **SBLC Block Release Packages**. All ADS managers must prepare releases for the SBLC IAW AFM 171-530, Volume I/II, Base Level Integrated Support System (BLISS). Once an error-free capture has been obtained, provide Quality Assurance with the following:
	(1) Two copies of the signed and dated BLISS release list (AM3R7R), the release summary (AM3RLS), and the release tape index (AM3RLT). Please ensure the name assigned to the release is in the following format: release number - system code - cycle number (example: R920901-M3-1). For those ADSs that can not use BLISS, two signed and dated copies of AF Form 636, Systems Change Release Document, are required. See attachment 6.1.1-3 (page 6-351).
	(2) Software Test Plan and all supporting test materials.
	(3) Minutes from the Test Readiness Review (TRR).
	(4) Software Test Report.
	(5) For new, revised, or changed documentation, see paragraph 6, 7, or 8 as applicable.
	(6) Release Projection Document.
	(7) Security Certification Letter.
	b. **Honeywell Block Release Packages**. All ADS managers must prepare releases for the Honeywell systems as prescribed below.
	(1) Two signed and dated copies of AF Form 636, Systems Change Release Document.
	(2) Software Test Plan and all supporting test materials.
	(3) Minutes from the Test Readiness Review (TRR).

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Atch 6.1.1-1, Continued
Turn-In and Release Procedures

✓	Item
	(4) Software Test Report.
	(5) User CAT/FILE strings with permissions for test JCL.
	(6) Tape number for:
	(a) Source Code.
	(b) Object software.
	(c) Any data files.
	(d) Test data.
	(7) For new, revised, or changed documentation, see paragraph 6, 7, or 8 as applicable.
	(8) Release Projection Document.
	(9) Security certification letter.
	c. **COOF Block Release Packages**. All ADS managers must prepare releases for the COOF IAW AFM 171-530, Volume I/II, Base Level Integrated Support System (BLISS). Once an error-free capture has been obtained, provide Quality Assurance with the following:
	(1) Two copies of the signed and dated BLISS release list (AM3R7R), the release summary (AM3RLS), and the release tape index (AM3RLT). Please ensure the name assigned to the release is in the following format: release number - system code - cycle number (example: C920901-TT-1). For those ADSs that can not use BLISS, two signed and dated copies of AF Form 636, Systems Change Release Document, are required.
	(2) Software Test Plan and all supporting test materials.
	(3) Minutes from the Test Readiness Review (TRR).
	(4) Software Test Report.
	(5) For new, revised, or changed documentation, see paragraph 6, 7, or 8 as applicable.
	(6) Release Projection Document.
	(7) Security certification letter.
	d. **Block Microcomputer Release Packages**. All ADS managers must prepare releases for microcomputer releases IAW AFM 171-530, Volume I/II, Base Level Integrated Support System (BLISS). Once an error-free capture has been obtained, provide Quality Assurance with the following:
	(1) Two copies of the signed and dated BLISS release list (AM3R7R), the release summary (AM3RLS), and the release tape index (AM3RLT). Please ensure the name assigned to the release is in the following format: release number - system code - cycle number (example: S920901-FS-1). For those ADSs that can not use BLISS, two signed and dated copies of AF Form 636, Systems Change Release Document, are required.
	(2) Software Test Plan and all supporting test materials.
	(3) Minutes from Test Readiness Review (TRR).
	(4) Software Test Report.
	(5) Release Projection Document.
	(6) For new, revised, or changed documentation, see paragraph 6, 7, or 8 as applicable.
	(7) Software to be released. This may consist of object code. When diskettes are involved, the procedures in paragraph 9 also apply.

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Atch 6.1.1-1, Continued
Turn-in and Release Procedures

✓	Item
	(8) Special Distribution Requirements. ADSs having special distribution requirements (i.e., addressees other than the SBLCs), must provide Release Control with the required information to allow them to update their address data base. ADS managers may maintain an address data base of their own if so desired; however, the address data base maintained in Release Control will be the one used to ship releases. NOTE: Maximum use will be made of the site's local Customer Service Center (CSC), Small Computer Technical Center (SCTC), or equivalent, for reproduction and on-base distribution of diskettes and related documentation. Additional on-base addressees will not be accepted.
	(9) See paragraph 9 for additional requirements.
	(10) Security certification letter.
	e. **Block Minicomputer Release Package**. Turn-in requirements for these systems vary by system and will be defined at the time the release schedule for that system is established. As a minimum, the following will be required.
	(1) Two copies of the signed and dated BLISS release list (AM3R7R), the release summary (AM3RLS), and the release tape index (AM3RLT). Please ensure the name assigned to the release is in the following format: release number - system code - cycle number (example: S920901-FS-1). For those ADSs that can not use BLISS, two signed and dated copies of AF Form 636, Systems Change Release Document, are required.
	(2) Software Test Plan and all supporting test materials.
	(3) Minutes from Test Readiness Review (TRR).
	(4) Software Test Report.
	(5) Release Projection Document.
	(6) For new, revised, or changed documentation, see paragraph 6, 7, or 8 as applicable.
	(7) Software to be released. This may consist of object code. When diskettes are involved, the procedures in paragraph 9 also apply.
	(8) Special Distribution Requirements. ADSs having special distribution requirements (i.e., addressees other than the SBLCs), must provide Release Control with the required information to allow them to update their address data base. ADS managers may maintain an address data base of their own if so desired; however, the address data base maintained in Release Control will be the one used to ship releases. NOTE: Maximum use will be made of the site's local Customer Service Center (CSC), Small Computer Technical Center (SCTC), or equivalent, for reproduction and on-base distribution of diskettes and related documentation. Additional on-base addressees will not be accepted.
	(9) Security certification letter.
	4. **Special Release Procedures**.
	a. All special releases must be requested by letter. Processing time for a routine special release is 30 days from the date the package is turned in to the date of shipment, depending on the amount of testing and editorial support required. The following letter format applies to all special releases:
	(1) Address the letter from:
	(a) Routine/Priority: Your Division.
	(b) Emergency: Your Director.

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Atch 6.1.1-1, Continued
Turn-In and Release Procedures

✓	Item
	(2) The subject of the letter will specify type of release, system title, and precedence of the release being requested (i.e., Special Release for the Core Automated Maintenance System (CAMS), Routine Precedence).
	(3) Address the letter to:
	(a) Routine/Priority: SSQ.
	(b) Emergency: SS.
	(4) System Code/DSD. (i.e., FS/G054)
	(5) Specific software (program names) to be released. NOTE: If an excessive amount of programs are being released, an attachment may be used.
	(6) Documentation (manual, volume, change number, title, number of pages) to be released. For documentation, see paragraph 6, 7, or 8.
	(7) Turn-in date. Provide the date the software is anticipated to be turned in to Release Control. NOTE: For each day the turn-in date is missed, the ship date must be adjusted accordingly.
	(8) Ship date. Provide the date the release is required to be shipped. Please ensure this date is consistent with the precedence being used.
	(9) Location. Provide name of base release is to be shipped to. Provide a distribution list if several sites are to receive this release. If addressee is not a normal distribution site, provide organization, office symbol, street address, base name, zip code, commercial telephone, as required by Release Control.
	(10) Justification. Explain the unique situation/problem the release will support or correct. NOTE: If this is a priority or emergency request, include in this paragraph the significant impact to the receiving site(s) if this release is not mailed by the shipped date requested. Please by specific.
	(11) POC and phone number.
	(12) Signature block.
	(a) Routine/priority: Your Division.
	(b) Emergency: Your Director.
	b. Responses to requests will be by indorsement.
	(1) For approved requests, initial notification will normally be provided by phone with formal response to follow with pertinent information applicable to the release. Upon notification of approval, turn-in package and release processing will begin.
	(2) For disapproved requests, initial notification will normally be accomplished by phone with formal response to follow with reason for disapproval.
	c. Datapoint and Wang Special Release Packages. Releases for these systems will be accomplished by submitting a request letter IAW the instructions in paragraph 4a above. Currently, these platforms are not tested by the Quality Assurance Directorate but provide editorial support and some logistic support. All paragraphs pertaining to documentation apply.
	d. All Other Release Packages (i.e., Unisys PCs, Zenith, 3B2, etc.). Releases for these systems will to be accomplished as a Special Release and all instructions in this paragraph apply. (As other platforms are introduced into the SSC environment, any special release procedures required for those platforms will be developed.)

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Atch 6.1.1-1, Continued
Turn-In and Release Procedures

✓	Item
	5. **Miscellaneous Release Procedures**. Turn-in requests for miscellaneous releases will be accomplished as follows:
	a. Requests to mail magnetic media to support unique situations require the following:
	(1) Request letter signed by directorate.
	(2) AF Form 636, Systems Change Release Document, signed and dated.
	(3) A printout of the information contained on the tape(s).
	b. Release Control will complete an AFCC Form 2244, Magnetic Tape Release Form, and pickup the tape from Production Control. Release Control will also provide a transmittal letter to accompany the tape.
	c. For the release of source code, paragraph 1 also applies.
	d. If the release is being hand carried, Release Control will package the tape(s).
	e. If the release is to be mailed, ensure a complete address is provided on the request letter, including a commercial phone number.
	6. **New Documentation Requirements**. Documentation being released to organizations outside SSC will be processed by Quality Assurance. Exceptions are certain functional user manuals that have approval to use other methods. Quality Assurance processing includes editing and reproduction which normally requires approximately 120 days. ADS managers must take this time into consideration when planning releases that include hard copy documentation. All new documentation packages must consist of the following:
	a. Announcement letter (see atch 5.4.1-1 figure 5.4.1-1).
	b. One reproducible copy or mats for editing.
	c. One copy for testing.
	d. AF Form 673, Request to Issue Publication, original plus 5 copies.
	e. AU Form 311, Printing and Collating Dummy Master.
	7. **Revised/Changed Documentation Requirements**. Documentation being released to organizations outside SSC will be processed by Quality Assurance. Exceptions are certain functional user manuals that have approval to use other methods. Quality Assurance processing includes editing and reproduction which normally requires approximately 70 days. ADS managers must take this time into consideration when planning releases that include hard copy documentation. All documentation packages must consist of the following:
	a. One reproducible copy or mats for editing.
	b. One copy for testing.
	c. AF Form 673, Request to Issue Publication, original plus 5 copies.
	8. **Revised/Changed Documentation Requirements for QT&E-II**. Documentation being released to QT&E-II sites will be in draft. Exceptions are certain functional user manuals that have approval to use other methods. The OPR will provide enough copies to Release Control to satisfy the request.
	9. **Diskette Copying Procedures**. The capability now exists to have diskettes reproduced in volume. This service was obtained primarily to prepare diskette releases for the Standard Systems Center; however, it may also be used to satisfy other requirements. Each of these and a verification process are addressed separately below.

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Atch 6.1.1-1, Continued
Turn-In and Release Procedures

✓	Item
	a. **Reproduction to Support Release Processing**. Requests for release will be prepared and processed IAW paragraph 4 above; however, when the release involves diskettes, the following additional information must be included as attachments to the request letter, or a part of the turn-in.
	(1) Authorization to Copy. The requester must ensure that all copyright laws have been adhered to and that the Government does in fact have authorization to copy the diskette(s). The requester must provide certification addressing the applicability of copyright laws or a copy of the agreement between the Government and vendor which allows reproduction of software.
	(2) Format of diskette to be reproduced.
	(a) "5.25" or "3.5".
	(b) Single or double sided.
	(c) Specify density (i.e., 360K, 720K, 1.4MB, etc.)
	(3) Type of computer used to create the diskette(s) (Datapoint, IBM, Unisys PC, Zenith, Wang, 3B2, etc.).
	(4) Two copies of each master diskette. If the number of files to be released will not fit in block 8 of AF Form 636, provide a directory listing of each diskette.
	(5) Diskette labels. Provide label information with release request. Release Control has the capability to print labels, via a laser printer, for 5.25 and 3.5 diskettes.
	b. **Reproduction to Support Local Requirements**. Due to the overhead associated with run set-up, it is not considered economical to reproduce quantities of less than 25 copies per original diskette. These should be copied on the source computer. When quantities justify use of this capability, submit letter of request, using format specified in paragraph 4. Further, the information defined in paragraph 5.9.a will be needed along with the number of copies required.
	c. **Verification**. Upon completion of our reproduction process, and prior to further processing, diskette verification will be required. The ADS manager/requester will be requested to select random diskettes from the copied diskettes for testing and evaluation prior to further processing or release of the copied diskettes.
	10. **Software/Documentation recycles**. A recycle is the returning of a package to the system manager after errors have been found, either by Quality Assurance or the developer, after the original turn-in. The following procedures must be followed for all recycled software or documentation.
	a. **Test and Evaluation** (Software/Documentation). The evaluator will notify the system manager that errors have been found and the package needs to be recycled. If possible, only those faulty portions will be returned, otherwise the entire package will be recycled. Once all errors are corrected, the package or portions must be turned in again using the original turn-in procedures.
	b. **OPR-Requested** (Software/Documentation). If the system manager discovers errors after a package is turned in, notify Release Control immediately. In this way, the evaluation can be delayed or suspended, thereby not wasting time testing faulty software. A recycle request letter, signed by the software system director, must be submitted to the Quality Assurance Directorate. Explain the problem and what must be done to correct it. Release Control will then return the entire package to the system manager. Once all errors are corrected, the package must be turned in again using the original turn-in procedures.

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Atch 6.1.1-1, Continued
Turn-In and Release Procedures

✓	Item
	c. **Documentation** (Editorial). The editor will notify the system manager and schedule a debriefing. After the debrief, the system manager must correct the errors and then return the documentation to the editor. When error-free, SSC/SSQM will obtain volume printing to satisfy distribution requirements.
	11. **Release of Source Programs**.
	a. The release of source code programs is strictly controlled. All SSC personnel must exercise utmost care when proposing the release of SSC developed source code. Only authorized sites with a thoroughly justified need are given access to source code.
	b. When requesting release of source code, the software system manager will route the release through SSC/SSML for staffing and approval/disapproval. If approved, the documentation listed below must accompany the request for release.
	(1) Approval Document.
	(2) Copies of justification, correspondence, or documents received from the requesting agency.
	(3) A disclaimer letter (original plus 2 copies) must be included. As a minimum, a disclaimer letters must state the following:
	(a) This software/documentation must not be offered to any other activity without prior SSC approval.
	(b) SSC will not be responsible for maintenance, updating, or correction of errors in the software or documentation.
	(c) If the release tapes belong to SSC, a statement reflecting current policy on the return of tapes should be included (i.e., for a commercial firm/institution, they should be returned within 10 days; for a Government installation, their return is not necessary, etc.).
	12. **General**.
	a. SSC will provide selected common-use software and documentation to the Federal Software Exchange Commission (FSEC) IAW Federal Property Management Regulation 101-36.16 for subsequent sale to authorized organizations. The local administration of the FSEC includes the life cycle manager's periodic review of software system candidates for submission to the FSEC. The software system manager will refer requests for FSEC software from NON-DoD federal, state, or local government agencies, educational institutions, and government contractors to the FSEC for action.
	b. If approved by the FSEC, the software system manager will follow the release preparation instructions in paragraph 4. In addition, attach copies of any justification, correspondence, or documents that you received from the requesting agency.

Atch 6.1.1-2
Qualification Test and Evaluation I Procedures

Purpose This attachment provides example procedures for conducting Qualification Test and Evaluation I testing. Ref(s): Adapted from SSCR 700-4, Vol II para 3-16 30 Oct 1987, change 1.

✓	Tasks	OPR
	1. Test Preparation	
	a. Ensure all required materials for conducting the test are available from the ADS Manager (see as a minimum the list of inputs for the QT&E I Perform Stage)	SSQ
	b. Decide if changes to program or documentation will be accepted after QT&E-I has started. Do not accept changes which would have an adverse impact on QT&E-I.	SSQ
	c. Ensure any required participation by user activity has been arranged by the ADS Manager	SSQ
	d. Ensure any emergency requests have been coordinated and approved by SSC/SS.	SSQ
	2. Test the Software	
	a. Execute all programs to ensure compliance with USAF standards, successful operability in the operating environment, and proper interface with other ADSs.	SSQ
	b. Analyze test results and decide if the system is operational and the impact of any problems.	SSQ
	c. Serious problems should be brought to the immediate attention of the ADS manager while lesser problems may be included in the software test report and the debrief to the ADS manager.	SSQ
	d. Task the ADS manager to correct serious software production problems within the QT&E I test period.	SSQ
	3. Evaluate Documentation	
	a. Examine the information system documentation to ensure it complies with USAF standards and supports the execution of the software production effort	SSQ
	b. Examine functional documentation to ensure it is compatible with the information system documentation and satisfies USAF standards requirements.	SSQ
	c. Decide (within SSC/SS) proper corrective action for non-conformance with AFM 171-100 standards that do not impact the processing environment at the DPC (e.g., invalid file-ID, invalid output header line format, blank page in output, etc.). SSC/SSQ cannot grant temporary waivers to AFM 171-100 standards.	SSQ
	4. Software Test Report	

	a. Prepare the Software Test Report 1) Send the system coordinator a formal written report (AFCC Form 2234 and 2234A) for projects less than 10 man-years. 2) Prepare a Software Test Report (STR) for projects equal to or greater than 10 man-years.	SSQ
	b. Debrief the ADS manager on test findings.	SSQ

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Atch 6.1.1-2, Continued
Qualification Test and Evaluation I Procedures

✓	Tasks	OPR
	c. Grant product certification on the final Software Test Report, after tests meet with SSC/SS approval.	SSQ
	d. Do not approve the system for operational use if serious software production problems are not corrected. SSC/SS will make this decision after consulting with the ADS manager.	SSQ
	e. Upon request, brief the SSC Executive Director, SSC Directors, unit(s), and interested ADS managers on the results of QT&E-I and the content of changes to be included during the block release period.	SSQ
	5. Special and Emergency Actions	
	a. Process emergency release requests. Handle any requirement that cannot be processed by the above procedures as an emergency release. SSC/SS will process emergency patches within one work day, and handle emergency tape releases as soon as possible.	SSQ
	b. Process special releases. Special releases may be submitted for release to satisfy one-time or unique requirements at selected locations at any time, but the software must be submitted at least 30 days before the desired release date, unless prior coordination has been made between the ADS manager and SSC/SS.	SSQ

Atch 6.1.1-3
Instructions For Preparing AFCC FORM 2212
Project Summary Sheet (PSS)

Purpose This attachment explains how to prepare AFCC Form 2212, Project Summary Sheet (PSS). Ref(s): Adapted from SSCR 700-4, Vol II atch 5, 30 Oct 1987, change 1.

BLOCK	DESCRIPTION
1. Project Title	Enter from the CSRD or AFCC Form 2185.
2. Control Number	Enter from the AFCC Form 2185.
3. Management Category	Check the appropriate block.
4. SCS	Enter the appropriate SCS number (10, 80, 59, 49, etc .).
5. DSD	Enter the assigned data system designator. As applicable.
6. System Code	Enter the assigned system code. As applicable.
7. Review/Action Accomplished	Circle the appropriate review(s) completed. If other actions were completed, circle OTHER.
8. Completion Date	Enter the date the review or other action was completed.
9. Typed or Printed Name, Grade, Title, Official Symbol or Author, Review/Approval Official	Self-explanatory.
10. Signature	The author signs if the PSS is used for information. The review official signs if the PSS serves as review minutes. The approval official signs if the PSS documents a change to an item previously approved, or provides additional project direction.
11. Narrative Summary	Check the appropriate box. If the first block is checked, enter no further information. If the last box is checked, enter a brief summary of the action, capturing main event(s) and their status(es). Continue on the back of the form if necessary.
Distribution	Panel members, participants, and SSC/HO

Atch 6.1.1-4
Instructions For Preparing System Release Form AF Form 636

Purpose This attachment explains how to prepare AF Forms 636 in accordance with AFM 171-110, Volume I, for S1100 releases. Refer to AFM 171-103, Management Support System (MSS), for instructions on how to generate an S1100 automated release document. A sample AF Form 636 is provided at Atch 6.1.1-5 (Page 355). Ref(s): Adapted from SSCR 700-4, Vol II atch 9, 30 Oct 1987, change 1.

BLOCK	DESCRIPTION
1	Identify the development agency: For example SSC/SSB
2	Enter the date the form was prepared.
3	Functional areas should leave this item blank. SSC/SSQM will complete this item at the time of release. For block releases, enter block release number (i.e., R930901, R931001, S930916, etc.).
4	Enter the system code under which the change is being released.
5	Enter the system title outlined for the system code in accordance with AFM 171-100, Vol II.
6	Enter the four-character system change number for this release The first two positions are the system code; the last two positions are consecutive numbers identifying the change number.
7	Enter the distribution list for the release. Enter "All SBLCs," "All H6000 commands," or the name of the base(s) when selective distribution (i.e., Hill AFB) is to be made.
8	Enter program/file IDs to be included on the release (UPDATE) tape. If more than nine programs/files are being released, list them on an attachment. For H6000: Include all programs/files on one tape and turn in a copy of the Object Library Utilization Report. (Do not list it as an attachment.)
9	Enter the version date(s) for the programs(s)/file(s) to be released in Gregorian (MMDDYY) format. If more than nine programs/files are being released, include their version dates on the same attachment as the program/file IDs.

10	Enter "OPR Coordination," "Upon Receipt," or the actual effective date depending on the following: a. Enter "OPR Coordination" if the SBLC system monitor must initiate some action before running the program or using the file at the DPC. This will include program change which result in: (1) A change in 'VALUE' statements. (2) The sequence of programs as automatically started by the system. (3) Changes in Product Control Number (PCN) and part paper/special forms requirements. b. If the program/file is effective upon receipt and does not require "OPR Coordination", enter "Upon Receipt." c. If the program/file is to become effective at some future date, enter the appropriate date, for example, 1 Jan 1988. For programs run annually or semi-annually, specify a future effective date when releasing new versions of programs and retain a backup version.

continued on next page ...

Atch 6.1.1-4, Continued
Instructions For Preparing System Release Form AF Form 636

BLOCK	DESCRIPTION
11	Enter the AFM 171 series manual number and date of each basic volume which currently supports the system. Complete this block even if no documentation is being released.
12	If applicable, enter the functional area manual number.
13	Enter the implementation/conversion documentation for the system.
14	State a meaningful reason for the change. If there is insufficient room, or if more than nine programs/files are being released, include them on an attachment.
15	Place the certification statement required (see SSCR 205-16) in this block. Enter any special instructions required by the base(s) or command(s) to implement this change. (Note: These may be listed as an attachment.) Programs/files being released for one-time conversion or update should state: "One-time conversion/update only. Do not add to Operational Master."
16	List all DIREPs, H6000 incident Reports, or PANs/SANs/TANs cleared or rescinded by this release. a. DIREP(s) or Incident Report(s). List DPC number, month received and sequential number (for example, 5410-10-341). b. PAN/SAN/TAN Numbers. List the PAN/SAN/TAN numbers assigned by the FAB. Include information on the release forms to clear "patches" transmitted during the previous release period.
17	List all programs (by version) which should be removed from the "Operational Master" tape. Do not remove programs being converted until the month following their conversion.
18	Identify all attachments to be distributed to addresses listed in Block 7. List continuation of blocks on the release form first; list manuals last. a. Continue Blocks 8,9, 10, 14, or 15 if needed. b. Include special instructions. c. AFM 171-XXX, Vol I, C1, 1 Jun 93. d. AFM 171-XXX, Vol II, C2, 1 Jun 93.
19	Enter the name, rank, office symbol, and telephone number of the System Coordinator for the release package.
20	Enter an "X" in the appropriate block.

continued on next page ...

Atch 6.1.1-4, Continued
Instructions For Preparing System Release Form AF Form 636

BLOCK	DESCRIPTION
21	Justify why an emergency release is required; specify clearly why the changes cannot be made on the next block release. Address: a. The condition which has caused, or will cause, a work stoppage in the field. b. The impact on the mission if the emergency release is not made or is delayed beyond the requested release date.
22	Enter any special instructions that SSC/SSQM or SSC/SSQT must use to process this release.
23	List the data files required to test the programs being released. Include the reel numbers for tape files, and the project control numbers (PCNs) for all projects involved. If there is insufficient room, list the PCNs on an attachment. (If an attachments is used, do not list it in Block 18.)
24	Enter by volume the number of documentation pages to be released.
25	Self-explanatory. For emergency releases, obtain the signature of the releasing Director or his/her authorized representative.
26	Used at the discretion of the development agency.
27	Used at the discretion of the development agency.

Atch 6.1.1-5
AF Form 636

(This is a sample. See SSC/QIDM, 6-4021, for a hard copy)

Atch 6.1.1-5, Continued
AF Form 636

Atch 6.1.1-6
Quality Control Checklist

Purpose This attachment provides an example Quality Control Checklist for use during test and evaluation. This list is not all inclusive, and may differ by ADS. Ref(s): Adapted from SSCR 700-4, Vol II atch 7, 30 Oct 1987, change 1.

✓	Item
	1. Has documentation been created IAW the following regulations? a. AFR 5-1, paragraph 1-11a -- Policy and Procedures Letters b. AFR 5-1, paragraph 5-3 -- OPR Responsibility c. AFR 5-1, Chapter 8 -- Changes d. AFR 5-1, paragraph 6-2e -- Announcement of Manual Publication. e. MIL-STD-SDD -- Software User Manual (SUM), Computer Center Software Operator Manual (CCSOM) f. MIL-STD-SDD -- Software Installation Plan (SIP)
	2. Have the following data system requirements been met? a. AFR 700-9, Vol I -- Data elements current? b. AFR 700-9, Vol I -- CSAD up-to-date? c. AFR 700-9, Vol II -- AF Form 247 prepared?
	3. Does documentation meet the following specifications? a. File IDs documented properly? b. All program messages documented? c. Job setups correct? d. Programs' core sizes agree with documentation? e. Optional input/output files documented? f. Product Control Numbers and Report Control Symbols agree with programs' input and output? g. Input/output products agree with SUM?
	4. Does the release document, AF Form 636 or AFCC Form 2186, meet the following requirements? a. Entries correct? b. Attachments included? c. Programs captured on magnetic tape for SSQ use? d. Version dates agree with those of the captured programs? e. Test data achieves objectives for indicated program change(s)?
	5. Have the following standards been met IAW AFM 171-100, Vol I? a. Waivers requested and approved? (Section 1) b. Interfacing agencies notified of changes(s)? (Section B) c. Supporting documents current and available in the project folder? (Sections 11 & 12) d. Testing accomplished? (Section 13)

continued on next page ...

Atch 6.1.1-6, Continued
Quality Control Checklist

✓	Item
	6. Have the following system control standards been met IAW AFM 171-100? (Note: OPRs are encouraged to use log analyzer (LA) in their analysis.)

	VOL I	VOL II	VOL III
a. System ID correct?		Sec 2	Sec 2
b. Program ID correct?		Sec 2	Sec 2
c. Library ID correct?		Sec 2	Sec 2
d. File ID correct?		Sec 2	Sec 2
e. Report/Product IDs correct?		Sec 9	Sec 2
f. ECL/JCL card setups specified?		Sec 2	

7. Have the following design programming standards been met IAW AFM 171-100? (Note: OPRs are encouraged to use LA in their analysis.)

	VOL I	VOL II	VOL III
a. Minimum standard configuration used?		Sec 3	Sec 3
b. Core usage correct?	Sec 6	Sec 3	Sec 3
c. Disk usage correct?		Sec 3	Sec 3
d. Tape usage correct?		Sec 3	Sec 3
e. Console usage proper?		Sec 3	Sec 3
f. Remote usage proper?	Sec 6	Sec 3	Sec 3
g. Card reader usage correct?		Sec 3	Sec 3
h. Card punch usage correct?		Sec 3	Sec 3
i. Printer usage correct?	Sec 9	Sec 3	Sec 3
(1) Unclassified print format?	Sec 9		
(2) Classified Print format?	Sec 9		
j. Collating sequence correct?		Sec 3	Sec 3
k. Character set correct?	Sec 10	Sec 3	Sec 3
l. Proper program requirements used?	Sec 6	Sec 3	Sec 3
m. Language requirements proper?	Sec 7	Sec 3	Sec 3
n. Decision logic tables proper?	Sec 5		

8. Have the following quality control special interests been met?
   a. Was the system analyzed to optimize blocking factors and segment overlays?
   b. Will file sizes and program limits accommodate the largest anticipated workload?
   c. Have output products been reviewed for blank pages?
   d. Is test data adequate to test system?

Atch 6.2.1-1
Qualification Test and Evaluation II Procedures

Purpose This attachment provides example procedures for conducting Qualification Test and Evaluation II testing. Ref(s): Adapted from SSCR 700-4, Vol II para 3-17, 30 Oct 1987, change 1.

✓	Tasks	OPR
	1. Submit an QT&E-II prototype request letter to SSC/SS with the information shown in attachment 6.2.1-2 (Page 6-362) at least 90 days before the QT&E-II prototype test start date. SSC/SS will use this letter to request MAJCOM approval for participation of base/MAJCOM DPCs as QT&E-II test facilities. The OPR/OCR should perform preliminary functional area (MAJCOM and base) coordination before submitting an QT&E-II/prototype request. If The QT&E-II or prototype activity requires additional equipment, the QT&E-II/prototype request letter must be submitted in sufficient time to allow the test sites to concur with the test and acquire equipment prior to the test start date.	Project Office
	2. With the quality control activity, will select test locations(s). Coordinate with MAJCOMs to determine which locations(s) can support the functional test requirements.	Project Office
	3. Use the Quality Control Checklist as described in attachment 6.1.1-6 (Page 6-357) as a test aid.	Project Office
	4. Provide SSC/SS all software production release packages for testing 35 days before the QT&E-II start date. Provide test sites instructions for reporting difficulties (DIREP, telephone calls, message, etc.) and submitting QT&E-II software test reports (RCS: CSV-CDD(AR)7502) by message to provide timely, accurate results of QT&E-II progress. See attachment 6.2.1-3 (Page 6-363). Final software test reports are due at SSC/SS within 10 working days after test completion. QT&E-II/prototype packages will contain copies of all documentation for distribution to test sites for maximum orientation/preparation. For changes to existing manuals, type or stamp the word "Test" at the top of each page of documentation to ensure it will not be mistaken for operational documentation. Change pages and AF Form 636/AFCC Form 2186 should instruct test sites to retain official documentation being replaced by "test" documentation in case the QT&E-II is discontinued for any reason. For new or completely revised manuals, stamp "Test" only on the cover page.	Project Office
	5. Take corrective action and submit QT&E-II or recycled prototype packages when problems are reported from test sites via telephone, trouble calls, DIREPS, or QT&E-II reports.	Project Office

	6. Help SSC/SS document the weekly status of QT&E-II for the SSC Executive Director's review.	Project Office
	7. Do not compile and/or patch a source program at a test site except when authorized by SSC/SS. (This would be extremely rare.)	Project Office
	8. Do not permit copies of, or access to, source code at a test site by the test site personnel unless authorized by SSC/SS. (This would be extremely rare.)	Project Office

continued on next page ...

Atch 6.2.1-1, Continued
Qualification Test and Evaluation II Procedures

✓	Tasks	OPR
	9. Certify system development efforts which process sensitive data as directed in AFR 205-16 and SSCR 205-16.	Project Office
	10. Ensure that the QT&E-II/prototype request letter is properly coordinated and ensure selected test sites satisfy QT&E-II or prototype test objectives.	SSQ
	11. Test all software production packages before releasing them to test sites. Use the Quality Control Checklist (attachment 6.1.1-6 on page 6-357) as a testing aid. Complete QT&E or prototype recycle testing within 30 days after submission., and release the recycle package after successful testing. Forward a written report (AFCC Form 2234 and 2234A) to the systems coordinator for recycle testing. Evaluate and test emergency recycles and patches for QT&E-II/prototype tests before release to the test sites. Process patches within one work day and tape releases as soon as possible.	SSQ
	12. Review and approve the software test plan and release advance "test" documentation to the test sites before the initial QT&E-II release.	SSQ
	13. Monitor and evaluate QT&E-II or prototype progress using test DIREPS, test advisory notices, and written or oral reports. As a minimum, telephone all test sites weekly during the test.	SSQ
	14. Ensure that reports are received from test sites when appropriate.	SSQ
	15. Recommend to the OPR corrective action for problems identified at the test sites.	SSQ
	16. Ensure the QT&E-II script follows the system test plan.	SSQ
	17. Visit test sites to monitor and evaluate test progress when required, subject to approval of the SSC/SS director.	SSQ
	18. Make an independent evaluation and write a final system test document after completion of QT&E-II testing.	SSQ
	19. Maintain permanent history of QT&E-II test activity.	SSQ
	20. During this test, MAJCOM and/or base-level personnel from communications-computer systems and functional user activities will complete an independent evaluation with minimum assistance from SSC/SS. Document and correct all problems before submitting a block release package for operational release.	SSQ
	21. Complete Software Test Report (STR) and provide copies to the ADS manager.	SSQ

Atch 6.2.1-2
Qualification Test And Evaluation II And Prototype Request Procedures

Purpose This attachment provides instructions for submitting a QT&E-II or Prototype Request. Ref(s): Adapted from SSCR 700-4, Vol II atch 13, 30 Oct 1987, change 1

✓	Tasks
	QT&E-II and prototype requests must include the following information and must reach SSC/SSQ at least 90 days prior to the expected QT&E-II prototype test start date. The ADS manager should have coordinated previously with the MAJCOM functional area counterparts.
	a. System title.
	b. System code/DSD.
	c. Security classification.
	d. Management category assigned.
	e. Number of programs involved.
	f. Processing frequency.
	g. Supporting documentation, including the number of pages and estimated impact.
	h. List, in order of preference, bases that can support the test.
	i. Proposed start and ending date for QT&E-II turn-in, QT&E-II, FQR, and QT&E/Worldwide release.
	j. TDY support requirements: Number of personnel, their AFSCs, and the bases they will support.
	k. Copies of related correspondence with HQ USAF, MAJCOM, etc.
	l. Impact on the DPC:
	(1) Run times: Daily, weekly, monthly, etc.
	(2) File requirements (disk, tape, card, etc.).
	(3) Training requirements for DPC personnel.
	(4) Equipment required over minimum standard configuration.
	(5) Parallel processing requirement.
	m. Fall-back procedures.
	n. Desired date for worldwide implementation.
	o. System coordinator, telephone number, office symbol.
	p. Other information that would contribute to planning an QT&E-II/Prototype. Attachments to the request letter must include approved ADS requirements, communications-computer system directives, communications-computer system project plans, functional descriptions, AFCC Form 2185, and software test plan (as applicable).

Atch 6.2.1-3
QT&E-II Instructions For Difficulty Reporting And Evaluations

Purpose This attachment provides instructions for submitting difficulty reports and evaluations during QT&E-II. Ref(s): Adapted from SSCR 700-4, Vol II atch 14, 30 Oct 1987, change 1

✓	Tasks
	A QT&E-II Software Test Plan should include instructions for difficulty reporting and submitting software test reports. The following are sample entries.
	a. Difficulty Reporting. Difficulty reporting procedures are outlined in SSCR 171-12. Procedures for this test are as follows:
	(1) Trouble calls. SSC/SSF, the Field Assistance (FAB), (DSN 596-5771) has copies of the manuals for this test. The ADS manager should direct all inquiries to the FAB to ensure proper monitoring of the system's test progress. The test site DPC manager and functional user are responsible for contacting the FAB by telephone when problems are encountered. Use DIREPs (see paragraph (2) below) to describe test-related incidents even after trouble calls are made.
	(2) Difficulty Reports (DIREPs) (S1100). The DPC manager must submit DIREPs on an as-required basis when immediate corrective action is not required. Mark DIREPs "QT&E-II," since internal SSC/SS handling procedures for systems in QT&E-II differ from those for worldwide operational systems. Forward three copies of each DIREP to SSC/SSF.
	(3) Test Advisory Notices (TANs). TANs are those notices dispatched by HQ SSC/SS only to test bases for the system under test. The test bases will use them in the same way that System Advisory Notices (SANs) are used for systems operational Air Force-wide.
	b. QT&E-II Software Test Report (RCS: DSC-SSC(AR)7502). The final report will significantly impact the decision whether to release this test software as an operational system.
	(1) Frequency. Both the functional user and DPC manager should provide formal reports on QT&E-II to SSC/SSQ within 10 working days after test completion. The user or DPC manager may send earlier reports if problems exist which require immediate attention for the test to proceed. SSC/SSQ will contact each test site weekly to determine the system's latest status for briefings to the SSC Directors.
	(2) Content. This narrative report should cover system operability, program deficiencies, completeness of implementation/conversion procedures, documentation adequacy, impact of the system from operational and management viewpoints, and the ability of the system to support functional requirements.

Atch 6.3.1-1
Qualification Operational Test & Evaluation Procedures

Purpose This attachment provides instructions for supporting AFOTEC QOT&E testing.
Ref(s): AFOTECR 55-9, AFR 80-14, TO 00-35D-54

✓	Tasks
	Refer to the above references for guidance on supporting AFOTEC testing.

7.0

Acronyms, Definition of Terms, and Document References

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7.1 Acronyms

Introduction This section identifies acronyms used within the SEP.

ADPE	Automatic Data Processing Equipment
ADPS	Automatic Data Processing System
ADS	Automated Data System
AFDSRS	Air Force Defense Software Repository System
AEE	Application Execution Environment
AF-IRDS	Air Force Information Resources Dictionary System
AFM	Air Force Manual
AFOTEC	Air Force Operational Test and Evaluation Center
AFR	Air Force Regulation
AIS	Automated Information System
ATCH	Attachment
BCR	Baseline Change Request
BLISS	Base Level Integrated Support System
CAMPUS	Center Automated Manpower and Project Update System
CAMS	Core Automated Maintenance System
CASE	Computer Aided Software Engineering
CAT/FILE	Catalogue and or File Names
CCB	Configuration Control Board
CCSOM	Computer Center Software Operator Manual
CCSR	Communications-Computer System Requirement
CDR	Critical Design Review
CI	Configuration Item
CIIN	Configuration Item Identification Number
CM	Configuration Management
CMP	Configuration Management Plan
COOF	Comptroller Office of the Future
COTS	Commercial-Off-The-Shelf
CRLCMP	Computer Resources Life Cycle Management Plan
CSC	Computer Software Component///Customer Service Center
CSCI	Computer Software Configuration Item
CSRD	Communications-Computer Systems Requirements Document
CSU	Computer Software Unit
DAA	Design Approval Authority
DBDD	Database Design Document
DBMS	Database Management System
DCB	Design Control Board
DCS	Deputy Chief of Staff
DDN	Digital Data Network
DDRS	Defense Data Repository System
DID	Data Item Description
DIREP	Difficulty Report
DISA	Defense Information Systems Agency
DoD	Department of Defense

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Acronyms (Cont'd)

DPC	Data Processing Center
DPM	Deputy Program Manager
DSD	Data System Designator
DT&E	Development Test and Evaluation
ECL	Executive Control Language
ECP	Engineering Change Proposal
ED	Executive Director
FAB	Field Assistance Branch
FCA	Functional Configuration Audit
FD	Functional Description
FP	Function Point
FQR	Formal Qualification Review
FSEC	Federal Software Exchange Commission
FSM	Firmware Support Manual
HUMS	Heads Up Message
HWCI	Hardware Configuration Item
IAW	In accordance with
I-CASE	Integrated Computer Aided Software Engineering
ICWG	Interface Control Working Group
IDD	Interface Design Document
IEEE	Institute of Electrical and Electronics Engineering
ILSP	Integrated Logistics Support Plan
INFOCEN	Information Center
IRA	Interface Requirements Agreement
IRR	Initial Requirements Review
IRS	Interface Requirements Specifications
JCL	Job Control Language
JOCAS	Job Order Cost Accounting System
JRMET	Joint Reliability and Maintainability Evaluation Team
KLOC	Lines of Code by Thousands
KSLOC	Source Lines of Code by Thousands
LA	Log Analyzer
LAN	Local Area Network
LOC	Lines of Code
MAJCOM	Major Command
MIL-STD	Military Standard
MIP	Material Improvement Project
MNS	Mission Needs Statement
MRB	MIP Review Board
OCD	Operational Concept Document
OCR	Office of Collateral Responsibility
OPR	Office of Primary Responsibility
ORD	Operations Requirement Document
OTE	Operational Test Environment

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Acronyms (Cont'd)

OT&E	Operational Test and Evaluation
PAN	Partial Advisory Notice
PCA	Physical Configuration Audit
PCE	Preliminary Cost Estimate
PCI	Product Configuration Identification
PDL	Program Design Language
PDR	Preliminary Design Review
PM	Program/Project Manager
PMD	Program Management Directive
PMO	Program Management Office
PMP	Program Management Plan
POC	Primary Office for Contact
POM	Program Objectives Memorandum
PQDR	Program Quality Discrepancy Reports
PSS	Project Summary Sheet
QA	Quality Assurance (synonymous with SQA)
QOT&E	Qualification Operational Test and Evaluation
QT&E	Qualification Test and Evaluation
Ref	Reference
RM	Requirements Management
RSA	Reusable Software Asset
RTM	Requirements Traceability Matrix
SANS	System Advisory Notices
SBLC	Standard Base Level Computer
SCCB	Software Configuration Control Board
SCM	Software Configuration Management
SCN	Specification Change Notice
SCS	Standard Communications-Computer Systems
SCTC	Small Computer Technical Center
SDD	Software Design Document
SDP	Software Development Plan
SDR	System Design Review
SEE	Software Engineering Environment
SEI	Software Engineering Institute
SEP	Software Engineering Process
SEPG	Software Engineering Process Group
SFR	Systems Functional Review
SMR	Special Management Review
SOA	Separate Operating Agency
SOW	Statement of Work
SPA	Software Process Assurance
SPAP	Software Process Assurance Plan
SPMS	Software Project Management System
SPT	Software Project Tracking
SPTO	Software Project Tracking and Oversight
SPP	Software Project Planning
SQA	Software Quality Assurance

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Acronyms (Cont'd)

SQC	Software Quality Council
SR	Software Release
SRR	System Requirements Review
SRS	Software Requirements Specification
SS	Subsystem Specifications
SSC	Standard Systems Center
SSC/OP	Director of Computer Operations
SSC/QID	Software Engineering Process Division
SSC/QIA	Software Process Assurance Division
SSCR	Standard Systems Center Regulation
SSC/RMB	Resource Management Business Office
SSC/RMF	Resource Management Financial Resources Division
SSC/SSB	Systems Software Division
SSC/SSQ	Quality Assurance Division
SSDD	System/Segment Design Document
SSP	Software Support Plan
SSR	Software Specification Review
SSS	System/Segment Specifications
ST	Software Testing
STD	Software Test Description
STP	Software Test Plan
SUM	Software User Manual
SVR	Systems Verification Review
TACE	Technical Analysis and Cost Estimate
TAN	Test Advisory Notice
TAR	Test Analysis Report
TDSB	Test Data Scoring Board
TEMP	Test and Evaluation Master Plan
TMO	Transportation Management Office
STP	Software Test Plan
TPWG	Test Plan Working Group
TQL	Total Quality Leadership
TRM	Technical Reference Model
TRR	Test Readiness Review
UDF	Unit Development Folder
WBS	Work Breakdown Structure
WPAFB OH	Wright Patterson Air Force Base, Ohio

7.2 Definition of Terms

Introduction This section defines terms used within the SEP.

Adaptive Maintenance - Software maintenance performed to make a computer program usable in a changed environment.

Allocated Baseline - In configuration management, the initial approved specifications governing the development of configuration items that are part of a higher level configuration item.

Allocated Configuration Item - In configuration management, the current approved specifications governing the development of configuration items that are part of a higher level configuration item (CI). Each specification (a) defines the functional characteristics that are allocated from those of the higher level CI, (b) establishes the tests required to demonstrate achievement of its allocated functional characteristics, (c) delineates necessary interface requirements with associated configuration items, and (d) establishes design constraints, if any.

Allocated Requirements - Subset of the system requirements that are to be implemented in the software components of the system.

American Standard Code for Information Interchange (ASCII) - The coded character set used for the general interchange of information among information processing systems, communication systems, and associated equipment.

Approval Authority (AA) - The AA is an individual authorized to commit resources to satisfy a requirement. An AA will be identified from each of the user and software support organizations for every validated requirement. AAs jointly approve official delivery schedules, version/release content, and changes to requirements, cost, and schedule.

Approved Requirement - A requirement that has received corporate agreement through an approval process on a technical solution to satisfy the validated requirement.

Audits - An independent examination of work products to assess compliance with specifications, standards, contractual agreements, or other criteria. See also Functional Configuration Audit and Physical Configuration Audit

Baseline - A specification or product that has been formally reviewed and agreed upon, that thereafter serves as the basis for further development, and that can be changed only through formal change and control procedures. (See also Allocated Baseline, Functional Baseline, and Product Baseline.)

Classes of Changes - Changes in configuration are controlled by classifying and processing changes as Class I or Class II changes.

Commercial Off The Shelf Software (COTS) - Commercially purchased, third-party software used to accomplish a specific function such as spread-sheets, word processing, utilities, and graphics.

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Compatibility - The ability of two or more systems or components to perform their required functions while sharing the same hardware and software environment. Also the ability of two or more systems or components to exchange information. Compare with "interoperability"

Compliance Terminology - The words "will", "shall", "must", and "required" are used to denote mandatory activities. The words "should", "could", "may", or "recommend" are used to denote recommended activities or alternatives not considered mandatory.

Computer Aided Software Engineering (CASE) - The use of computers to aid in the software engineering process. May include the application of software tools for software design, requirements tracing, code production, testing, document generation, and other software engineering activities.

Computer Resource Life Cycle Configuration Management Plan - The government plan for managing mission critical computer resources including software throughout a system's life.

Computer Software Component (CSC) - A functionally or logically distinct part of a Computer Software Configuration Item (CSCI), typically an aggregate of two of more software units.

Computer Software Configuration Item (CSCI) - An aggregation of software that is designed for configuration management and treated as a single entity in the configuration management process.

Computer Software Unit (CSU) - An element specified in the design of a CSC that is separately testable.

Configuration - In configuration management, the functional and/or physical characteristics of hardware/software as set forth in technical documentation and achieved in the product.

Configuration Control - A process of configuration management, consisting of the evaluation, coordination, approval or disapproval, and implementation of changes to configuration items after formal establishment of their configuration identification.

Configuration Control Board - A group of people responsible for evaluating and approving or disapproving proposed changes to configuration items (CIs), and for ensuring implementation of approved changes.

Configuration Identification - An element of configuration management, consisting of selecting the configuration items for a system and recording their functional and physical characteristics in technical documentation. Also, the current approved technical documentation for a configuration item as set forth in specifications, drawings, associated lists, and documents referenced therein.

Configuration Item (CI) - A collection of hardware or software elements treated as a unit for the purpose of configuration management.

Configuration Item Identification Number (CIIN) - A CIIN is the permanent number assigned by the design activity to identify a configuration item. A formal seven digit number is available.

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Configuration Management (CM) - The process of identifying and defining the configuration items in a system, controlling the release and change of these items throughout the system Life Cycle, recording and reporting the status of configuration items and change requests, and verifying the completeness and correctness of configuration items.

Configuration Management Plan (CMP) - Addresses each phase of the system Life Cycle and establishes the type of operation and any support agency interfaces. The CMP will use the Software Life Cycle Model (SLCM) outlined in the SCCC Paradigm guidebook, and uses the high-level flow diagram as the backbone of all planning and implementation. The high level flow diagram can be broken down into activities that are broken out into checklists and references for each individual activity. Each checklist guides the different individuals or groups through the tasks for that specific activity. The checklists are further expanded with detailed explanations for each item or task.

Configuration Reviews - Ensure technical understanding and visibility while verifying that the design satisfies the requirement. Reviews are part of the system engineering process, which is a logical sequence of activities and decisions for developing a communications-computer system.

Configuration Status Accounting - A process of configuration management, consisting of the recording and reporting of information needed to manage a configuration effectively. This information includes a listing of the approved configuration identification, the status of proposed changes to the configuration, and the implementation status of the approved changes.

Configuration Status Accounting and Reporting System - An automated database system that provides the Configuration Manager with both historical and current data related to system change activity.

Corrective Maintenance - Maintenance performed specifically to overcome existing faults.

Critical Design Review (CDR) - a review conducted: (1) to verify that the detailed design of one or more configuration items satisfies specified requirements; (2) to establish the compatibility among the configuration items and other items of equipment, facilities, software, and personnel; (3) to assess risk areas for each configuration item; and, as applicable, (4) to assess the results of producability analyses, review preliminary hardware product specifications, evaluate preliminary test planning, and evaluate the adequacy of preliminary operation and support documents.

Database Specification - Describes the database organization and storage allocation and provides the detailed data model of the logical and physical design, as well as other necessary information.

Design Control Board (DCB) - The Change Control Board established IAW AFR 14-1, to provide for proper change evaluation, processing, approval/disapproval, and implementation for each CI in the command centers major command and control systems.

Design Approval Authority (DAA) - The DAA is an individual authorized to commit resources to satisfy a requirement. A DAA will be identified from each of the user and software support organizations for every validated requirement. DAAs jointly approve official delivery schedules, version/release content, and changes to requirements, cost, and schedule.

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Development Test and Evaluation (DT&E) - The test and evaluation that allows the Air Force to demonstrate that system engineering design and development is complete, design risks have been minimized, and the system performs as required and specified. DT&E includes the test and evaluation of components, subsystems, hardware/software integration, associated software, and pre-production models of the systems.

Efficiency: (1) The degree to which the software performs its intended functions with minimum consumption of computer time and storage resources, (2) The extent to which software performs its intended functions with a minimum consumption of computing resources, (3) the amount of computing resources and code required by the program to perform its function.

Engineering Change - In configuration management, an alteration in the configuration of a configuration item or other designated item after formal establishment of its configuration identification.

Engineering Change Proposal (ECP) - In configuration management, a proposed engineering change and the documentation by which the change is described and suggested.

Flexibility - The ease with which a system or component can be modified for use in applications or environments other than those for which it was specifically designed.

Formal Qualification Review (FQR) - The test, inspection, or analytical process by which a group of configuration items comprising a system is verified to have met specific contractual performance requirements.

Functional Baseline - In configuration management, the initial approved technical documentation for a configuration item.

Functional Configuration Audit (FCA) - An audit conducted to verify: (1) that the development of a configuration item has been completed satisfactorily; (2) that the item has achieved the performance and functional characteristics specified in the functional or allocated configuration identification; (3) that its operational and support documents are complete and satisfactory.

Functional Description (FD) - Defines the system requirements which will serve as a basis for mutual understanding between the user and developer.

Inspections - A static analysis technique that relies on visual examination of development products to detect errors, violations of development standards, and other problems. Types include code inspections and design inspection.

Integrity - The degree to which systems or components prevent unauthorized access to, or modification of, computer programs or data.

Interoperability - The ability of two or more systems to exchange information and to use the information that has been exchanged.

Interface Design Document (IDD) - Specifies the detailed design for one or more interfaces between one or more CSCIs and other configuration items or critical items.

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Maintainability - The ease with which a software system or component can be modified to correct faults, improve performance or other attributes, or adapt to changed environment. Also, the ease with which a hardware system or component can be retained in, or restored to, a state in which it can perform its required function.

Methodology - A defined approach or process for doing software development or portions of software development. Methodologies can be either Life Cycle or phase. Life Cycle refers to those methods that apply across the entire life of the software, from conception to death (i.e., the spiral software development method and the waterfall method). Phase refers to methods generally confined to a phase (or couple of phases) of the software Life Cycle, such as testing, requirements, and design methods (i.e., Structured Requirements Analysis, Object Oriented Design).

Migration System - An existing AIS, or a planned and approved AIS, that has been officially designated to support standard processes for a functional activity. Migration systems can be applicable DoD-wide or DoD Component-wide.

Office of Primary Responsibility (OPR) - An office or individual designated as the central point of contact for a specific task, project, etc.

Operations Manual - Provides computer control personnel and computer operators in an information processing center with a detailed operational description of the system and its associated environment.

Operational Baseline - See Baseline

Operational Test and Evaluation (OT&E) - The test and evaluation conducted to determine a system's operational effectiveness and suitability under realistic combat conditions and to determine if the minimum operational performance requirements as specified in the Operational Requirements Document have been satisfied.

Perfective Maintenance - Software maintenance performed to improve the performance, maintainability, or other attributes of a computer program.

Physical Configuration Audit (PCA) - An audit conducted to verify that a configuration item, as built, conforms to the technical documentation that defines it.

Preliminary Cost Estimate (PCE) - Initial rough estimate of resource requirements and schedule. This cost estimate will be updated after a complete requirements analysis/definition has been completed.

Preliminary Design Review (PDR) - A review conducted: (1) to evaluate the progress, technical adequacy, and risk resolution of the selected design approach for one or more configuration items; (2) to determine each design's compatibility with the requirements for the configuration item; (3) to evaluate the degree of definition and assess the technical risk associated with the selected manufacturing methods and processes; to establish the existence and compatibility of the physical and functional interfaces among the configuration items and other items of equipment, facilities, software and personnel; and, as applicable, (4) to evaluate the preliminary operational and support documents.

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Product Baseline - Established by verifying the product specifications.

Product Configuration Identification (PCI) - The current approved or conditionally approved technical documentation which defines the configuration of a CI during the production, operation, maintenance, and logistic support phases of its Life Cycle, and which prescribes (a) all necessary physical or form, fit and function characteristics of a CI, (b) the selected functional characteristics for production acceptance testing, and (c) the production acceptance tests.

Reliability: 1. The degree to which the software consistently performs its intended functions. 2. The probability that software will not cause the failure of a system for a specified time under specified conditions. The probability is a function of the inputs to and use of the system as well as a function of the existence of faults in the software. The inputs to the system determine whether existing faults, if any are encountered. 3. The ability of a program to perform a required function under stated conditions for a stated period of time. 4. The degree to which the software can be expected to consistently perform its intended function with precision and accuracy.

Requirement: 1. A condition of capability needed by the user to solve a problem or achieve an objective. 2. A stated need calling for a software solution, software support, or technical service.

Requirements Validation - The official confirmation by the submitting organization that a requirement is needed to satisfy or more effectively perform the mission.

Reusability: 1. The degree to which the software, documentation, object definition, etc., can be used in multiple applications. 2. The extent to which a program (or parts of a program) can be reused in other applications. This is related to the packaging and the scope of the functions that the program performs.

Reviews - Evaluations of software element(s) or project status to ascertain discrepancies from planned results and to recommend improvement. These evaluations follow a formal process (for example, management review process, work review process, inspection process, or walk through process).

Software Configuration Control Board (SCCB) - A committee formed to review all BCRs and CSRDs before submission for formal approval at the Design Control Board (DCB). The SCCB will also review work in progress in order to provide an update at the DCB.

Software Development Plan (SDP) - The formal set of plans used to produce, maintain, and enhance software. Usually made up of a set of phase methods combined with configuration management, project management, and quality assurance for an integrated Life Cycle.

Software Project Management System (SPMS) - The set of defined processes, standards, measurements, metrics, and tools used to manage software development/maintenance efforts.

Software Test Description (STD) - The test cases and test procedures necessary to perform testing of a Computer Software Configuration Item (CSCI), an integrated group of CSCIs or CSCIs/HWCIs, or a software system or segment.

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Software Test Plan (STP) - The test plan provides guidance for the management and technical effort necessary throughout the test period. It establishes a comprehensive test plan and communicates the nature and extent of the tests deemed necessary to provide a basis for evaluation of the system. It is used to coordinate an orderly schedule of events, a specification of equipment and organizational requirements, the methodology of testing, a list of materials to be delivered, and a schedule of user orientation. It provides a written record of the actual test inputs to exercise system limits and critical capabilities, the instructions to permit execution of tests, and the expected outputs.

Software Work Products - Any artifact created as part of defining, maintaining, or using a software process, including process descriptions, plans, procedures, computer programs, and associated documentation, which may or may not be intended for delivery to a customer or end user. Examples of software work products include plans, estimates, data on actual effort, corrective action documentation, and requirements documents.

Specification Change Notice (SCN) - A document used to propose, transmit, and record changes to a specification. In proposed form, prior to approval, the SCN supplies proposed changes in the text of each page.

Subsystem Specifications (SS) - The logical breakdown of a system into separate areas of responsibility, such as functions, where each breakdown is composed of a software unit or series of units (Computer Software Components (CSC)). It should be as detailed as possible concerning the environment and design elements in order to provide maximum guidance to the software design effort.

System Requirements Review (SRR) - The objective of this review is to ascertain the adequacy of the contractor's efforts in defining system requirements. It will be conducted when a significant portion of the system functional requirements has been established.

System/Segment Specifications (SSS) - Provides a detailed definition of the System/Subsystem functions. It documents details of the on-going analysis between the user's operational personnel and the appropriate development personnel. It defines in detail the interfaces with other systems and subsystems and the facilities to be used for accomplishing the interfaces.

Tailoring - The process by which specific requirements of selected specifications, standards, data item descriptors, and related documents are evaluated to determine the extent to which they are suitable for incorporation into the contractual documents being written as part of the contract for a CI, and the modification of these requirements to ensure each achieves an optimal balance between operational needs and cost.

Work Reviews - A series of system engineering activities by which the technical progress of a project is assessed relative to its technical and/or contractual requirements. The reviews provide a method for the contractor and government to determine that the development of a CI and its identification have met contract milestone requirements.

Technical Analysis and Cost Estimate (TACE) - A study to determine whether a requirement can be implemented with the current resources and technology.

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Test and Evaluation Master Plan (TEMP) - The primary document used to assess adequacy of planned DT&E. It contains a mission and/or system description, the required operational/technical characteristics, critical technical/operational issues, test management responsibilities, DT&E and OT&E outlines including objectives, and a test resource summary.

Testing - The effort required to ensure that the software performs its intended function.

Unit Development Folder (UDF) - This folder is designed to communicate information required to explain in detail, the design and maintenance for all modules of coding within a given coding unit. It will also provide the necessary guidelines and framework of reference to develop the next level or levels of detail within the coding unit.

Usability: 1. The effort required to learn the human interface with the software, to prepare input, and to interpret output of the software. 2. The relative effort for using software (training and operation).

Users Manual - A manual that completely describes the capabilities and functions of a system or software package. Ideally, it should provide the user with scenarios or examples.

Validation: 1. The process of evaluating software to determine compliance with specified requirements. 2. The process of evaluating software at the end of the software development process to ensure compliance with the software requirements.

Validation Authority - An individual from the submitting agency, designated in writing, who has the authority to endorse a requirement as needed.

Validated Requirement - A requirement that has received corporate agreement with the need identified by the requirement and verified by a validation authority. A validated requirement is not automatically an approved requirement.

Verification: 1. The process of evaluating the products of a given software activity to determine correctness and consistency with respect to the products and standards provided as input to that activity. 2. The process of determining whether or not the products of a given phase of the software development cycle fulfill the requirements established during the previous phase. 3. The act of reviewing, inspecting, testing, checking, auditing, or otherwise establishing and documenting whether or not items, processes, services, or documents conform to specified requirements.

Version - A change to a baseline configuration item that modifies its functional capabilities. As functional capabilities are added to, modified within, or deleted from a baseline configuration item, its version identifier changes.

Version Description Document - This data item is used to accompany changes to an approved and released computer program. Its purpose is to identify the changes made and the exact version of a computer program to be delivered.

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Waiver - A written authorization to accept a configuration item or other designated items, which, during production or after having been submitted for inspection, are found to depart from specified requirements, but nevertheless are considered suitable for use "as is" or after rework by an approved method. Also, the written authorization to deviate from the SSC Standard Processes defined in this document.

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7.3 Document Reference List

Introduction This section identifies all documents referenced within the SEP.

AFM 171-100	Automatic Data Processing Systems and Procedures
AFM 171-100 (Vol I)	Automated Data Systems (ADS) Standards
AFM 171-100 (Vol II)	Automated Data Systems (ADS) Standards - H6000 Series
AFM 171-100 (Vol V)	Automated Data Systems (ADS) Series ADP
AFM 171-100 (Vol VI)	Development and Documentation of Automated Data Systems (ADS) - Small Computer
AFM 171-100 (Vol VIII)	Automated Data Systems (ADS) Standard Multi-user Small Computer Requirements Contract (SMSCRC) System
AFM 171-103	Management Support System (MSS)
AFM 171-110 (Vol I)	U1100 Technical Information Manual (TIM), DPC Management
AFM 171-530 (Vol I/II)	Base Level Integrated Support System (BLISS)

AFOTECR 55-9	Management of Operational Test and Evaluation

AFP 172-4	Air Force Budget Process

AFPD 33-2	C4 Systems Security

AFR 5-1	Air Force Publications Management Program
AFR 14-1	Configuration Management
AFR 55-43	Management of Operational Test and Evaluation
AFR 80-14	Test and Evaluation
AFR 205-16	Communications-Computer security procedures and responsibilities
AFR 700-4, Vol II	Communications-Computer Systems Acquisition and Major Automated Information Systems Review Requirements
AFR 700-9 (Vol I)	Information Systems Standardization Program
AFR 700-9 (Vol II)	Information Systems Data Element Standardization and Management Program

AFR 800-2	Acquisition Program Management

AF Supplement to DoDI 5000.2 - Acquisition Management Policies and Procedures

AFSSI 5001	Systems Security Policy Generation

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Document Reference List (Cont'd)

AFSSI 5102	Computer Security for Operational Systems
AFSSM 5018	Air Force Systems Security Memorandum

DoD 5000 series	Defense Acquisition

DoD-STD 480B	Configuration Control, Engineering Changes, Deviations and Waivers
DoD 5200.28	Security Requirements for Automated Information Systems
DoD-7045.7	Implementation of PPBS
DoD 8020.1-M (draft)	Functional Process Improvement
DoD 8320.1-M (draft)	Data Administration Procedures, Dated: 15 Dec 92
DoD 8320.1-M-1	Data Element Standardization Procedures, Dated: Jan 93
DoDI 5000.2	Defense Acquisition Management Policies and Procedures
DoDD 5000.2M	Defense Acquisition Management Documentation and Reports
DoDI 7041.3	Economic Analysis and Program Evaluation for Resource Management
DoDI-7920.4	Baselining of Automated Information Systems

HQ Operating Instruction 800-2 - Program Management Directive Guidance

MIL-HDBK-245B	Preparation of Statement of Work (SOW)

MIL-STD-SDD	Software Development and Documentation

MIL-STD-483A	Configuration Management Practices for Systems, Equipment, Munitions, and Computer Programs
MIL-STD-881B	Work Breakdown Structures for Defense Materiel Items
MIL-STD-973	Configuration Management
MIL-STD 1521B	Technical Reviews and Audits for Systems, Equipment, and Computer Software
MIL-STD-1815A	Ada Programming Language

MIL-STD-2167A	Defense System Software Development

SEI-93-TR-6	"Taxonomy-Based Risk Identification", Technical Report Software Engineering Institute, Pittsburgh, PA, June 1993
SSCR 171-12	Automated Data Processing Systems

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Document Reference List (Cont'd)

SSCR 205-16	Communications-Computer Security Policy, Procedures, and Responsibilities
SSCR 700-3	Communications-Computer System Requirements Documentation, Analysis, and Approval
SSCR 700-4 (Vol II)	SSC Automated Data Systems Production Process
SSCR 700-10	Graphical User Interface Standards

TO 00-35D-54	USAF Materiel Deficiency Reporting and Investigating System

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7.4 Document Cross-Reference Table

Introduction This section identifies all references to documents identified within the SEP.

Item	Reference
Baseline Change Request (BCR)	AFR 700-4, Vol II
Computer Center Software Operator Manual (CCSOM)	MIL-STD-SDD
Computer Resources Life Cycle Management Plan (CRLCMP)	AF Supplement 1 to DoDI 5000.2
Configuration Management (CM)	MIL-STD-973
Configuration Management Plan (CMP)	MIL-STD-973, AFR 14-1, MIL-STD-483A
Communications-Computer System Requirement Document (CSRD)	SSCR 700-3
Database Design Document (DBDD)	MIL-STD-SDD
Engineering Change Proposal (ECP)	MIL-STD-973, DoD-STD-480B
Functional Configuration Audit (FCA)	MIL-STD-973, MIL-STD-1521B
Functional Economic Analysis (FEA)	AFR 173-15, DoD 8020.1-M, DoDI 7041.3
Formal Qualification Review (FQR)	MIL-STD-1521B
Firmware Support Manual (FSM)	MIL-STD-SDD
Interface Design Document (IDD)	MIL-STD-SDD
Integrated Logistics Support Plan (ILSP)	DoDI 5000.2
Internal Requirements Review (IRR)	SSCR 700-3
Interface Requirements Specifications (IRS)	MIL-STD-SDD
Joint Reliability and Maintainability Evaluation Team (JRMET)	AFOTECR 55-9, AFR 80-14, TO 00-35D-54
Material Improvement Project (MIP)	TO 00-35D-54
Mission Needs Statement (MNS)	DoDI 5000.2
MIP Review Board (MRB)	AFOTECR 55-9, AFR 80-14, TO 00-35D-54
Operational Concept Document (OCD)	MIL-STD-SDD
Operations Requirement Document (ORD)	DoD Manual 5000.2-M
Operational Test and Evaluation (OT&E)	AFOTECR 55-9
Physical Configuration Audit (PCA)	MIL-STD-973, MIL-STD-1521B

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Document Cross-Reference Table, (Cont'd)

Item	Reference
Program Management Directive (PMD)	SSCR 700-3, HQ Operating Instruction 800-2
Program Management Plan (PMP)	AFR 800-2
Program Objectives Memorandum (POM)	AFP 172-4, DoD-STD-7045.7
Program Quality Discrepancy Reports (PQDR)	TO 00-35D-54
Qualification Operational Test and Evaluation (QOT&E)	AFR 80-14
Qualification Test and Evaluation (QT&E)	AFR 80-14
Specification Change Notice (SCN)	MIL-STD-973, DoD-STD-480B
Software Design Document (SDD)	MIL-STD-SDD
Software Development Plan (SDP)	MIL-STD-SDD
Software Design Review (SDR)	MIL-STD-1521B
Systems Functional Review (SFR)	MIL-STD-1521B
Special Management Review (SMR)	MIL-STD-1521B
Statement of Work (SOW)	MIL-HDBK-245B
System Requirements Review (SRR)	MIL-STD-1521B
Software Requirements Specification (SRS)	MIL-STD-SDD
System/Segment Design Document (SSDD)	MIL-STD-SDD
Software Support Plan (SSP)	MIL-STD-SDD
Software Specification Review (SSR)	MIL-STD-1521B
System/Segment Specifications (SSS)	MIL-STD-SDD
Software Test Description (STD)	MIL-STD-SDD
Software Test Plan (STP)	MIL-STD-SDD
Software User Manual (SUM)	MIL-STD-SDD
Test Data Scoring Board (TDSB)	AFOTECR 55-9
Test and Evaluation Master Plan (TEMP)	DoDD 5000.2M, Part 7
Test Plan Working Group (TPWG)	AFR 80-14
Test Readiness Review (TRR)	MIL-STD-1521B
Work Breakdown Structure (WBS)	MIL-STD-881B

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Appendices

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Appendix A

Review Procedures

Review Procedures Overview

Overview

The following reviews are conducted at the completion of each software engineering process (Need Analysis, Project Planning, System Requirements/Design, Software Requirements Analysis, Software Design, Code and Test, QT&E I, QT&E II, QOT&E, and Product Release). The purpose of these reviews is described as follows:

	Work Review
	A Work Review is conducted to perform an in-depth analysis of documents developed during each of the software engineering processes. This review should surface errors and issues, but will not necessarily correct them. The focus for this review is technical rather than editorial. This review is conducted approximately two weeks before the formal review and is critical to ensure that each document is ready to be baselined. The Work Review focuses on the technical perspective, not on functional requirements. If appropriate, a functional review may be desired during this same time period. A Work Review team will be established to evaluate these documents. A primary and alternate representative should be identified. This team must be established early in the life cycle. The proposed baselined document is submitted to each team member with a letter directing what areas each should focus on. A chairman should be elected from the proposed Work Review team; this should not be the same person each time. The review team should be sized in relationship to the size of your project. The chairman will identify someone to record minutes and action items. The chairman is also responsible for keeping the meeting on track and ensuring everyone understands their role; he will also present the findings at the upcoming formal review. These findings should state that the document is one of the following: (a) ready for baseline; (b) ready to baseline with changes; (c) or, not ready for baseline because the team cannot reach a consensus or too many corrections required. If the technical team feels that the document cannot be baselined at this point, the chairman will discuss this with the program manager who will either proceed with the management review or delay.

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Review Procedures Overview, Continued

Overview, (Cont'd)

	Management Review
	Management reviews obtain senior-level management's approval/disapproval of the technical Review Team's findings. Time needed for a review should range from one to two hours. Emphasis should be to hold the review to as short a time as possible. The review focuses on the project status and covers a summary of information from the Work Review as well as detailed information on unresolved issues surfaced at the Work Review . If additional information is required, prepare a background package for senior managers to take with them. The review should be scaled according to the size of the program. For large projects this review is normally co-chaired by a senior manager and the OPR for the system or the OPR's representative. Invitees are at the discretion of the program managers. A presentation request must be completed to invite senior managers to attend and participate in the formal review. This provides them with background information on the type of people will be there, and what we expect from them. The OPR must sign a Project Summary Sheet stating whether to proceed or make changes. A suggested grouping would be anyone that has a stake in your system; (preferably keep it at a higher level (2-letters, 3-letters)), and a representative from the Software Process Assurance Group (SPAG).

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Review Procedures Overview, Continued

Overview, (Cont'd)

	Program/Special Management Reviews
	The Program/Special Management Reviews (PMR/SMR) are periodic reviews of the status of all programs/projects within the SSC. The PMR/SMR enables the approval official or other management officials to review the status of a software production effort at any time in the production process. At this review, the Program/Project Manager (PM) presents total program/project status to the Air Force functional OPR and the user community, and identifies elements of the program where progress is not in accordance with plans. Conduct a SMR when an economic analysis reveals that costs between milestones exceed projected costs by 15 percent; scheduled milestones slip by 120 days; or, additional manpower is needed over and above that specified in the last validation review. Conduct a PMR to provide senior management with a regularly scheduled status review of a program including major milestone approval. Each review is chaired by the command section and the review panel will be the SSC two letters. A SMR is conducted two times per year unless otherwise requested by the command section. A PMR is scheduled as needed. SSC/SSPP, with cooperation of the PM, schedules the PMR/SMR. SSC two letters nominate the next program/project to be reviewed. The review content is determined by the program/project office who ensures that the presentation will include all pertinent information to adequately communicate the true status of the program/project. The program/project office takes minutes and tracks assigned action items. Since this is only a review of current status, a technical support staff need not assist the command section at this review. However, technical specialists from various support activities (i.e., software process assurance, system software, security, systems management, system engineering, architecture and integration, and software modernization) should be encouraged to attend.

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Review Procedures Overview, Continued

Overview, (Cont'd)

	Initial Requirements Review
	The purpose of the Initial Requiments Review (IRR) is to ensure all logical participants have been identified and given an opportunity to assess the requirement, present problems (with solutions) that might obstruct the successful implementation of the requirement, provide management visibility, commit SSC resources, and turn the requirement over to the appropriate implementing organization. The IRR is performed after the requirement has been validated and prioritized by the functional OPR or appropriate validation authority. The IRR is conducted IAW procedures outlined in SSCR 700-3 which calls for formal or informal IRRs depending on the system size and management category. Upon successful completion of the IRR, the approval official will sign the requirement/management document (such as the CSRD or CSD) verifying that all matters have been resolved and the requirement is ready to be allocated with resources.
	System Requirements Review
	The primary objective of the System Requirements Review (SRR) is to ascertain the adequacy of the system requirements definition effort. The SRR is conducted normally during the system Concept Exploration or Demonstration and Validation phase after a significant portion of the system functional requirements has been established. This is normally after functional analysis and preliminary requirements allocation to determine initial direction and progress of the contractor's System Engineering Management effort and assess whether an optimum and complete configuration is probable. The total System Engineering Management activity is reviewed for responsiveness to the Statement of Work and system/segment requirements. Details for conducting the review are found in MIL-STD-1521B, Appendix A.

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Review Procedures Overview, Continued

Overview, (Cont'd)

	System Design Review
	The purpose of the System Design Review (SDR) is to evaluate the optimization, traceability, correlation, completeness, and the risk of the allocated requirements, including the corresponding test requirements, in fulfilling the system/segment requirements. The SDR is the final review before proceeding with preliminary design of HWCIs and detailed requirements analysis for CSCIs. The SDR encompasses the total system requirements (i.e., operations / maintenance / test / training hardware, software, facilities, personnel, preliminary logistic support considerations etc). Included in the review is a summary of the System Engineering Management activities to include mission and requirements analysis, functional analysis, requirements allocation, manufacturing methods/process selection, program risk analysis, system/cost effectiveness analysis, logistics support analysis, trade studies, intra- and inter-system interface studies, integrated test planning, specialty discipline studies, and configuration management. The SDR shall produce a technical understanding of the validity and degree of completeness of: the System/Segment Specifications, engineering design/cost of the system, preliminary Operational Concept Document, preliminary Software Requirements Specifications, and the preliminary Interface Requirements Specifications.
	Software Specification Review
	The Software Specification Review (SSR) is a formal review of a CSCI's requirements as specified in the Software Requirements Specification and the Interface Requirements Specifications. The SSR is normally conducted after the System Design Review but prior to the start of CSCI preliminary design. A collective SSR for a group of configuration items (treating each configuration item individually) may be conducted when such an approach is considered advantageous to the contracting agency. The purpose of the SSR is to establish the allocated baseline for preliminary CSCI design by demonstrating the adequacy of the Software Requirements Specifications (SRS), Interface Requirements Specifications (IRS), and Operational Concept Document (OCD).

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Review Procedures Overview, Continued

Overview, (Cont'd)

	Preliminary Design Review
	The Preliminary Design Review (PDR) is a formal Work Review of the basic design approach for a configuration item or for a functionally related group of configuration items. A collective PDR for a group of configuration items (treating each configuration item individually) may be conducted when such an approach is considered advantageous to the contracting agency. The PDR is conducted prior to the start of detailed design, but after completion of: the hardware development specifications, the Software Architectural Design (SAD), the Software Test Plan (STP), and the HWCI Test Plan. Other items that should be available for this review are preliminary versions of: the Computer Center Software Operator Manual (CCSOM) and the Software User's Manual (SUM). The overall technical program risks associated with each configuration item shall also be reviewed on a technical, cost, and schedule basis. A technical understanding shall be reached on the validity and the degree of completeness of the SAD, HWCI Test Plan, STP, and the preliminary versions of the CCSOM, SUM.
	Critical Design Review
	The Critical Design Review (CDR) is conducted on each configuration item prior to fabrication/production/coding release to ensure that the detail design solutions, as reflected in the Software Design Document (SDD), Data Base Design Document (DBDD), Interface Design Document (IDD), and engineering drawings that satisfy requirements established by the hardware development specification. Prior to the CDR, the following items should have been updated or completed: (CCSOM) and (SUM). For extraordinarily large complex configuration items, the CDR may be conducted on an incremental basis, i.e., progress reviews versus a single CDR. A technical understanding shall be reached on the validity and degree of completeness of: the SDD, IDD, DBDD, as well as preliminary versions of the CCSOM, SUM and the STP.

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Review Procedures Overview, Continued

Overview, (Cont'd)

	Test Readiness Review
	The Test Readiness Review (TRR) is a formal review of the contractor's readiness to begin formal CSCI testing. The TRR is conducted after software test procedures are available and CSC integration testing is complete. The purpose of the TRR is for the contracting agency to determine whether the contractor is in fact ready to begin CSCI testing. A technical understanding shall be reached on the informal test results, and on the validity and the degree of completeness of the Computer Center Software Operator Manual (CCSOM), and the Software User's Manual (SUM). Sample items to be reviewed are: requirements changes, design changes, software test plans and descriptions, software test procedures, CSC integration test cases, procedures, and results.
	Formal Qualification Review
	The objectives of the Formal Qualification Review (FQR) are: to ensure the completed software development products comply with all requirements and standards; to verify that the actual performance of configuration items, as determined through tests, comply with the Hardware Development Specification, Software Requirements and Interface Requirements Specifications; to identify the test report(s)/data which document results of configuration item qualification tests; and to obtain approval for operational release. When feasible, the FQR may be combined with the Functional Configuration Audit (FCA) at the end of configuration item/subsystem testing, and prior to the Physical Configuration Audit (PCA). If sufficient test results are not available at the FCA to ensure the configuration items will perform in their system environment, the FQR may be delayed until the necessary tests have been successfully completed to enable certification of configuration items, or as late as system testing. For non-combined FCA/FQRs, traceability, correlation, and completeness of the FQR shall be maintained with the FCA; avoiding duplication of effort. Approval at the conclusion of the FQR establishes the product baseline. All changes received from this point will be in the form of a DIREP, trouble report, or new requirements document.

continued on next page...

Review Procedures Overview, Continued

Overview, (Cont'd)

	Peer Review
	The purpose of the Peer Review is to remove defects from software work products early and efficiently and to develop a better understanding of the software work products and the potential defects that might be prevented. The Peer Review is a methodical examination of the coded software by the producer's peers to identify defects and areas where efficiency improvements are needed. Two primary accomplishments of the Peer Review are: (1) system logic and program logic are reviewed in detail by a technician other than the originator, and (2) the originator of the logic has the benefit of other technicians' experience and knowledge. Both should ensure good practices and techniques have been employed and that sound, efficient software has been produced which is easily modifiable and maintainable.

Develop & Distribute Review Package

Procedures The following table outlines the procedures necessary in preparing for a review.

Step	Procedures
1	Identify review objective. (See Checklist-1)
2	Identify review participates. (Contact SSC/SSPP for assistance)
3	Schedule facilities.
4	Identify meeting logistics. (Date, time, location)
5	Notify review participates/panel members.
6	Outline meeting guidelines and develop an agenda. (See Sample-A1)
7	Develop slides complying with standard format. (Contact SSC/RMMI)
8	Develop and distribute review package to participates/panel members. (Minimum 1 week prior to review)

Checklist-1

Description The following actions are a summation of tasks that may be accomplished to determine if requirements have been satisfied during the process of identifying the objective of the review and determining whether the appropriate review can be accomplished.

✓	Action
	Determine the purpose for the review.
	Determine if sufficient funding is available.
	Determine the possibility of cost overruns.
	Determine if requirements alter the hardware and software architecture of the current system.
	Identify what must be evaluated to determine which user requirements are valid.
	Determine if user requirements are satisfied.
	Determine if scheduled milestone can be met.
	Determine if proper documentation is available.
	Identify any potential problems.
	Determine the appropriateness of the technical solution.
	Determine who is best qualified to speak on user requirements.
	Determine who is best qualified to speak from a system viewpoint.
	Determine how the user should present this case/findings.
	Determine who can best advise the chairman on the technical credibility of the presentations.
	Determine what questions should be answered by whom.

Sample-A1

The Review Meeting Agenda

Definition The agenda describes the format the review meeting will follow. It is used by the chairperson to keep the meeting structured and on time.

Audience The agenda is distributed as part of the review package to the reviewers, chairperson, and recorder.

Agenda Items The table below describes the agenda items of the review meeting and the rationale associated with each item.

Agenda Item	Description	Rationale
Introduction	The chairperson opens the meeting.	Ensures that the reviewers understand and follow the review guidelines. Also allows the chairperson to determine the readiness to proceed with the review.
Overview	The producer presents a brief overview of the product under review.	Provides the reviewers with the producers perspective of the product under review.
Raise Issues	The reviewers raise issues and concerns.	Allows reviewers the opportunity to communicate their issues to the producer.
Discuss Issues	Issues are discussed and summarized.	
Review Closure (Wrap-up)	The chairperson brings the review to closure.	Allow review participants to explicitly agree on the next steps for the product.

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Sample-A1, Continued

The Review Meeting Agenda

Agenda Items Guidelines

The following table provides further guidelines for each agenda item.

Agenda Item	Guidelines
Introduction	The Chairperson: • Introduces the participants • States the objective of the review • States any groundrules or guidelines • Requests each reviewer to comment on his/her state of readiness • Determines readiness to proceed with the meeting
Overviews	The producer provides the reviewers with his perspective of the product under review. Often this involved describing: • Intended audience of the product • The purpose of the product • Expected next step after the review
Raise issues	See the table below for guidelines.

Review Closure (Wrap-up)	The chairperson:
	• Ask each review for disposition
	  • proceed to next step with the product as is
	  • proceed to next step, but modify the product as per the issues raised
	  • modify the product as per issues raised and re-review
	• Summarizes responses and proposes next step
	• Thanks reviewers and recorder
	• Adjourns the meeting

Raised issues Guidelines

This table describes several ways to cover the material being reviewed.

Approach	Comment
Page at a time	This approach is useful when a detailed review is desired.
Logical section at a time	Same as above but has the advantage that physical page boundaries do not interfere with the coverage of the material.
Issue at a time	Useful for occasions where limited time is time is available and the intent is to identify high-level issues.
Global issues/local issues	Same as above but has the advantage to assure that all high-level issues are raised first.

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Conducting the Review Meeting

Procedures

The following table outlines the steps in conducting a review meeting.

Step	Action	Performed by
1	Introduce participants	Chairperson
2	State review objective	Chairperson
3	State groundrules	Chairperson
4	Ask each reviewer if they are prepared to proceed with the review	Chairperson
5	Are the majority of reviewers prepared for the review? • If **yes**, go to Step 6 • If **no**, disposition is re-review and go to Step 15	Chairperson
6	Present overview of the product being reviewed	Producer
7	State review format (*The approach taken to cover the material being reviewed*). **Example:** Issues will be raised page by page.	Chairperson
8	Raise issue	Reviewer
9	Discuss issue	Producer and Reviewer
10	Summarize issue	Chairperson
11	Record issue	Recorder
12	Repeat Steps 7 through 10 until all issues have been raised OR time has run out	
13	Ask each reviewer for their disposition	Chairperson
14	Reach consensus on next step	Chairperson
15	Adjourn meeting	Chairperson

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Software Engineering Institute (SEI) Software Process Definition Reference Manual

Track, Address, and Publish Review Issues

Document & Distribute Review Minutes Package

Procedures

The table below outlines the procedures necessary in following-up on issues and concerns raised during a review.

✓	Procedures
	Develop a list of issues and concerns raised during the review meeting. (See Sample-A2)
	Identify and develop issue response list per issue requiring action/resolution. (See Sample-A3)
	Develop a revised copy
	Distribute review minutes package. (See Checklist-2)
	Develop and submit a written thanks to review participates/panel members.

Sample-A2

Issues Information List

Definition The issues list is a written description of all the issues and concerns that were raised during the review meeting.

Prepared The issues list is produced by the recorder.

Audience The issues list is distributed as part of the review minutes package to reviewers, chairperson, and recorder.

Content The following tables describes the information that must be captured for each issue.

Content	Description	Rationale
Issue Description	The statement of the issues as summarized by the chairperson.	To ensure that the issues are recorded accurately and consistently, only the summary of the issues provided by the chairperson should be recorded.
Issue (Product Reference)	The part of the product that the issue refers to. **Example:** For a local issue, this information would include the page, section, and paragraph number.	This information provides context about the issue. Also it tells the producer what must be modified should a change be warranted.
Reviewer Reference (POC)	The name of the reviewer that raised the issue.	This lets the producer know whom to contact should further discussion be warranted.

Template A template for the Issues Information List is provided on the next page.

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continued on next page ...

Sample-A2 Continued

Sample Sheet

Issues Information List

Issue Number: _____ **Date:** _____

Issue (Product Reference): _____

_____

_____

_____

_____

_____

Issue Description: _____

_____

_____

_____

_____

_____

POC/Office/Phone Number: _____

Sample-A3

Issues Response List

Definition

The issues response list is a written description of all the issues and concerns that were raised during the review meeting which required an additional action or further resolution.

Prepared

The issues response list is produced by the recorder.

Audience

The issues response list is distributed as part of the review minutes package to reviewers, chairperson, and recorder.

Content

The following table describes the information that must be captured for each issue.

Content	Description	Rationale
Issue (Product Reference)	The part of the product that the issue refers to. **Example:** For a local issue, this information would include the page, section, and paragraph number.	This information provides context about the issue. Also it tells the producer what must be modified should a change be warranted.
Issue Response	The action/resolution for each issue described in the issue list	This information documents the action(s) taken to resolve the issue.
Reviewer Reference (POC)	The name of the reviewer that raised the issue.	This lets the producer know whom to contact should further discussion be warranted.

Template

A template for the Issues Response List is provided on the next page.

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The Software Engineering Institute (SEI) Software Process Definition Reference Manual

continued on next page ...

Sample-A3, Continued

Sample Sheet

Issues Response List

Issue Number: _____ **Date:** _____

Issue (Product Reference): _____

_____

_____

_____

_____

_____

Issue Response (Action): _____

_____

_____

_____

_____

_____

POC/Office/Phone Number: _____

Checklist-2

Review Minutes Package

Description The review minutes packages documents the review itself and any action taken as a result of the review.

Prepared by The review minutes package is prepared by the producer.

Audience The review minutes package is distributed to all review participants (reviewers, chairperson, and recorder).

Components The table below describes the contents of the review minutes package.

Component	Descriptions
Issues list	A written description of the issues that were raised during the review meeting
Issue response	The action/resolution for each issue described in the issues list
Results of the review	The actions to be taken as a result of the review. Note: This need not be a point by point response to each issue but should specify what is to be done next by whom.
Revised copy of the product	
Thank you	A written thanks to the reviewers, chairperson, and recorder.

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Appendix B

Tracking Process (JOCAS II)

(This is a handout. Contact SSC/QIDM, 6-4021, for a hard copy)

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Appendix C

Data Element Standardization

Data Standardization

Procedures The following table outlines the procedures necessary to construct data elements.

✓	Procedures
	• The following are guiding directives for constructing data elements: - DoD 8320.1-M (DRAFT) -- Data Administration Procedures, Dated: 15 Dec 92 - DoD 8320.1-M-1 -- Data Element Standardization Procedures, Dated: Jan 93
	• Data element developers should review: - Standard data elements in AF-IRDS (located at AFC4A, Scott AFB IL) - DDRS (located at DISA) Note: This should be done prior to developing new data elements. New data elements will be submitted to SSC/SSMS for review. Reuse is a high priority. Both AF-IRDS and DDRS are accessible over DDN, and require USERIDs and PASSWORDS.
	• Data element are submitted in three phases and must be accompanied with a data model (preferrably IDEFIX). • Data elements are submitted to SSC/SSMS in the following order: - Prime Objects (with the data model) - Generic Elements - Standard Data Elements • SSC/SSMS will forward data elements and the data model to AFC4A for Air Force approval, and for submission to DISA (DoD). Note: Worksheets are available from SSC/SSMS. SSC/SSMS reserves the right to reject data elements, and return rejected data elements to the developer for correction or additional information. SSC/SSMS will serve as the SSC liaison between data element developers and the AFC4A and/or DISA.

Appendix D

SEP Tailoring Guide

SEP Tailoring Worksheet Overview

Overview

The purpose for the Software Engineering Process (SEP) is to bring all processes within the Standard Systems Center (SSC) together under a single process that will provide guidance (or, in some cases, references to guidance) for all software environments (new development, maintenance (corrective, adaptive, perfective, preventive), small computer, mainframe, etc.), regardless of the project type or the current point in a project's life cycle. However, it should be clear that all activities in the SEP may not apply to every project or environment.

To allow for unique situations, we created a SEP "TAILORING WORKSHEET". The Tailoring Guide is a list of minimum activities that should apply to most projects. The worksheet lists all activities from each stage in the SEP, identified with a corresponding paragraph number.

Obviously there will be situations where particularly activities will have to be added that are not checked as "mandatory". Each program/project manager must ensure that all activities are given due consideration.

SEP Tailoring Worksheet

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
			NEED ANALYSIS	**4.1**	
	✓		Process Communications-Computer System Requirements Document (CSRD)	4.1.1	
	✓		- Submit CSRD to SSC/RMBT	4.1.1	
	✓		- Assign a Resource Management Project Officer	4.1.1	
	✓		- Initialize an ADS Folder	4.1.1	
✓	✓		All requirements (including PMDs, MNS, or ORDs) should be routed through the security office (SSC/RMMS).	4.1.1	
	✓		Conduct Program Start Review	4.1.1	
			Before starting the PSR:		
	✓		- Conduct Security Risk Assessment	4.1.1	

	✓		- Identify DAA	4.1.1	
	✓		- Discuss key issues with functional experts	4.1.1	
	✓		- Conduct a manpower assessment	4.1.1	
	✓		- Create a preliminary program schedule	4.1.1	
	✓		- Assess technology availability	4.1.1	
	✓		- Prepare a chart briefing using the ESC Training Guide charts as samples	4.1.1	
	✓		Start PSR: Composed of SSC command staff, key functional staff directors, and the user, to include a DAA representative.	4.1.1	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
	✓		- Program Manager briefs roundtable members on requirements, technology assessment, technical alternatives, cost and schedule baseline, and initial strategy	4.1.1	
			- Members advise on alternatives and issues based on their experience	4.1.1	
	✓		Obtain approval from SSC/ED/EV/EA to commit resources and proceed	4.1.1	
	✓		Develop Program Management Plan (PMP) (to include applicable plans in the Project Planning Perform Activity of the SEP)	AFR 800-2	
	✓		- Establish a lead DAA if not previously done	AFR 800-2	
	✓		Prepare Operational Concept Document (OCD)	Atch 4.1.1-1	
	✓		Perform S/W Reengineering Assmt	4.1.1	
			Review directives in Chapter 3 of SEP	3.3	
	✓		Identify lead base(s) for prototype and testing field (QOT&E-II)	4.1.1	
	✓		Include initial system security policy in the Operational Concept Document	4.1.1	
			Conduct needs analysis	4.1.1	
✓	✓		- Analyze Communications-Computer System Requirements Document (CSRD)	4.1.1	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
			- Conduct:		
✓	✓		-- Technical Analysis and Cost Estimate	4.1.1	
	✓		--- The Center technical director will review technical approach	4.1.1	
	✓		-- Operational Security Needs Analysis	4.1.1	
	✓		-- Domain Analysis	4.1.1	
			-- Risk Analysis:		
	✓		--- Technical	4.1.1	
	✓		--- Supportability	4.1.1	
			--- Programatic	4.1.1	
	✓		--- Cost and Schedule	4.1.1	
			-- Security Risk Analysis	4.1.1	
			-- In-house/Contractor Analysis	4.1.1	
			-- Lease/Purchase Analysis	4.1.1	
			-- Level of Effort Baseline	4.1.1	
			-- POM Documentation	4.1.1	
	✓		-- Impact on Existing Workload	4.1.1	
	✓		-- Identify SSC support facilities	4.1.1	
	✓		Conduct Work Review	4.1.2	
✓	✓		Update metric data	4.1.3	
	✓		Conduct Management Review (Initial Requirements Review)	4.1.4	
			PROJECT PLANNING	**4.2**	
✓	✓		Identify Resources	Atch 4.2.1-1	
	✓		Develop Project Manager Procedures	Atch 4.2.1-1	
✓	✓		Develop Estimates - Negotiate all estimates with affected groups	Atch 4.1.3-1	
✓	✓		Develop High-Level Schedule	Atch 4.2.1-2	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
✓	✓		Develop Detailed Schedule	Atch 4.2.1-3	
			Develop the following plans:		
	✓		- Software Development Plan	4.2.1	
			-- Considerations: Software Program Life Cycle Strategies; Rapid Prototyping, and Simulations	Appendix L 5.4.2-2	
	✓		-- Include system architecture	5.3.1-1	
	✓		-- Estimate effort and cost		
			-- Include a plan for site communication layouts, site preparation and facility security certification/accreditation		
			Identify logistics requirements	Appendix K	
	✓		- Software Configuration Management Plan	Appendix G	
	✓		- Software Process Assurance Plan	Appendix I	
	✓		- Test and Evaluation Master Plan	4.2.1	
			- Systems Training Plan	DoDI 5000.2	
	✓		- Computer Resources Life Cycle Management Plan	4.2.1	
	✓		- Integrated Logistic Support Plan	4.2.1	
	✓		- Software Support Plan	4.2.1	
			- System Security Plan	4.2.1	
			- Security Test and Evaluation Plan	4.2.1	
	✓		Draft Interface Requirements Agreement	5.1.1-1	
	✓		Conduct Work Review	4.2.2	
✓	✓		Update metric data	4.2.3	
	✓		Conduct Management Review (System Requirements Review)	4.2.4	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
			SYSTEM REQUIREMENT/DESIGN	**5.1**	
			Obtain training on requirements analysis.	Atch 5.1.1-1	
✓	✓		Identify and plan customer involvement.	Atch 5.1.1-1	
✓	✓		Coordinate activities with SSC support offices	Appendix E	
✓	✓		Review existing documentation/software.	Atch 5.1.1-1	
			Analyze problem domain analysis.	Atch 5.1.1-1	
			Conduct customer interview.	Atch 5.1.1-1	
			Conduct user surveys.	Atch 5.1.1-1	
			Identify and evaluate reusable system requirements	Appendix F	
	✓		Specify the requirements for the system or a segment of the system.	Atch 5.1.1-1	
	✓		Establish interface control working group (ICWG).	Atch 5.1.1-1	
	✓		Update Risk Analysis Document	Atch 5.1.1-1	
✓	✓		Update Software Development Plan	Atch 5.1.1-1	
	✓		Update Test and Evaluation Master Plan	DoDD 5000.2M, Part 7	
			Perform logistics support analysis - Update the CRLCMP and ILSP	Appendix K	
✓	✓		Research standard data elements and data standardization	Appendix C	
	✓		Complete Interface Requirements Agreement	Atch 5.1.1-1	
	✓		Develop System/Segment Design Document	MIL-STD-SDD	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
	✓		Develop System/Segment Specification	MIL-STD-SDD	
	✓		Develop Requirements Traceability Matrix	Atch 5.1.1-1	
			Draft the following:		
✓	✓		- Security Documents	Atch 5.4.2-3	
	✓		- Interface Requirement Specifications	MIL-STD-SDD	
	✓		- Software Requirements Specifications	MIL-STD-SDD	
	✓		Conduct Work Review	5.1.2	
✓	✓		Update metric data	5.1.3	
	✓		Conduct Management Review (System Design Review)	5.1.4	
	✓		Establish Functional Baseline	Appendix G	
			SOFTWARE REQUIREMENTS	**5.2**	
			Obtain training in software requirements methodology.	Atch 5.2.1-1	
✓	✓		Identify and plan customer involvement.	Atch 5.2.1-1	
✓	✓		Identify and evaluate reuse software	Appendix F	
	✓		Coordinate activities with SSC Support Office	Appendix E	
	✓		Review system requirements.	Atch 5.2.1-1	
			Develop prototypes as required.	Atch 5.2.1-1	
			Reuse the available software requirements.	Appendix F	
	✓		Complete Software Requirements Specifications	MIL-STD-SDD	
	✓		Complete Interface Requirements Specifications	MIL-STD-SDD	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
	✓		Update Test and Evaluation Master Plan	DoDD 5000.2M, Part 7	
✓	✓		Update Software Development Plan	MIL-STD-SDD	
	✓		Update Requirements Traceability Matrix	Atch 5.1.1-1	
			Identify and document method for verifying each software requirement:		
✓	✓		- Draft Software Test Plans	MIL-STD-SDD	
✓	✓		- Draft Software Test Description	MIL-STD-SDD	
	✓		- Test and Evaluation Master Plan	DoDD 5000.2M, Part 7	
✓			Submit a Baseline Change Request (BCR) to update the Software/System Specifications document as necessary.	Appendix G	
	✓		Conduct Work Review	5.2.2	
✓	✓		Update metric data	5.2.3	
			Conduct Management Review (Software Specification Review)	5.2.4	
	✓		Establish Allocated Baseline		
			SOFTWARE DESIGN	**5.3**	
			Obtain training for Design Methodology.	5.3.1-1	
	✓		Review SSC standards on design analysis.	5.3.1-1	
			Review system and software requirements document	Atch 5.3.1-1	
	✓		Update Architectural Design	Atch 5.3.1-1	
			Database Design:		
	✓		- Conceptual	Atch 5.3.1-1	
	✓		- Logical	Atch 5.3.1-1	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
	✓		- Physical	Atch 5.3.1-1	
			Detailed Design (software sub-components):		
✓	✓		- Data Structures	Atch 5.3.1-1	
✓	✓		- Algorithms	Atch 5.3.1-1	
✓	✓		- Control information	Atch 5.3.1-1	
✓	✓		Update Software Development Plan	MIL-STD-SDD	
	✓		Update Requirements Traceability Matrix	Atch 5.1.1-1	
	✓		Design Interface(s)	Atch 5.3.1-1	
			Develop Design Prototypes	Atch 5.3.1-1	
			Reuse available software design assets.	Appendix F	
			Periodically review and inspect the design.	Atch 5.3.1-1	
			Coordinate tasks with appropriate working group(s).	Atch 5.3.1-1	
✓	✓		Use standard data elements.	Appendix C	
			Develop/update the following documents:		
✓	✓		- Software Design Document	MIL-STD-SDD	
✓	✓		- Interface Design Document	MIL-STD-SDD	
✓	✓		- Database Design Document	MIL-STD-SDD	
✓	✓		- Computer Center Software Operator Manual (draft)	MIL-STD-SDD	
✓	✓		- Software Users Manual (draft)	MIL-STD-SDD	
✓	✓		- Software Test Plan (draft)	MIL-STD-SDD	
✓	✓		- Software Test Description /Cases(draft)	MIL-STD-SDD	
	✓		Conduct Work Review	5.3.2	
✓	✓		Update metric data	5.3.3	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
	✓		Conduct Management Review (Preliminary Design/Critical Design Reviews)	5.3.4	
			CODE AND TEST	**5.4**	
			Obtain training in code and testing methodology.	Atch 5.4.1-1	
			Prepare publication announcement.	Atch 5.4.1-1	
✓	✓		Identify and evaluate reusable code assets.	Atch 5.4.1-1	
✓	✓		Review Design and Requirements Documents	Atch 5.4.1-1	
✓	✓		Develop the source code	Atch 5.4.1-1	
✓	✓		Generate executables	Atch 5.4.1-1	
			Reuse code assets	Appendix F	
✓	✓		Perform testing	Atch 5.4.1-1	
			Reuse test assets	Appendix F	
			Develop Software Installation Plan	5.4.1	
			Establish software and/or documentation baseline.	5.4.1	
			Establish the priority of the release-emergency, block special.	5.4.1	
			Capture software, required release date, identify sites for QT&E-II. Create release document.	5.4.1	
			Identify the Difficulty Reports, Systems Advisory Notices etc. that are cleared by this release.	5.4.1	
			Collect test data, test scripts, expected outputs etc. required by the software test plan.	5.4.1	
			Collect the software onto magnetic media for tranmittal to SSQ.	5.4.1	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
			Update the following:		
✓	✓		- Software Test Plan	MIL-STD-SDD	
✓	✓		- Software Test Description	MIL-STD-SDD	
✓	✓		- Computer Center Software Operator Manual	MIL-STD-SDD	
✓	✓		- Software User Manual	MIL-STD-SDD	
	✓		- Requirements Traceabilility Matrix	Atch 5.1.1-1	
	✓		Conduct Work Review	5.4.2	
✓	✓		Update metric data	5.4.3	
	✓		Conduct Management Review	5.4.4	
✓	✓		Establish Product Baseline		
			Qualification Test & Evaluation I	**6.1**	
✓	✓		Prepare Test	Atch 6.1.1-2	
✓	✓		Test the Software	Atch 6.1.1-2	
✓	✓		Evaluate Documentation	Atch 6.1.1-2	
✓	✓		Software Test Report	Atch 6.1.1-2	
✓	✓		Conduct Work Review	6.1.2	
✓	✓		Update Project Indicators	6.1.3	
✓	✓		Conduct Management Review	6.1.4	
			Qualification Test & Evaluation II	**6.2**	
*	✓		Prepare Test	Atch 6.2.1-1	
*	✓		Select AF Sites	Atch 6.2.1-1	
*	✓		Provide Sites Test Material	Atch 6.2.1-1	
*	✓		Test the Software	Atch 6.2.1-1	
*	✓		Evaluate Documentation	Atch 6.2.1-1	
*	✓		Software Test Report	Atch 6.2.1-1	
*	✓		Conduct Work Review	6.2.2	
*	✓		Update Project Indicators	6.2.3	
*	✓		Conduct Management Review	6.2.4	

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SEP Tailoring Worksheet, Continued

❶ Mandatory Activities for Software Maintenance (Includes corrective and low-risk, low manpower adaptive, perfective, and preventive maintenance).
❷ Mandatory Activities for New Software Development (Includes a new system, reengineering a system, or high-risk, high manpower adaptive, perfective,and preventive maintenance.
* Depends on project/program complexity.

❶	❷		Perform Activity	SEP Paragraphs/ References	Estimate/ActualTime Spent per Activity
			Qualification Operational Test & Evaluation	**6.3**	
	✓		Chair the Test Plan Working Group (TPWG)	Atch 6.3.1-1	
	✓		Chair the Joint Reliability and Maintainability Evaluation Team (JRMET)	Atch 6.3.1-1	
	✓		Chair the Material Improvement Project (MIP) Review Board (MRB)	Atch 6.3.1-1	
	✓		Provide Membership on the Test Data Scoring Board	Atch 6.3.1-1	
	✓		Conduct Work Review	6.3.2	
	✓		Update Project Indicators	6.3.3	
	✓		Conduct Management Review	6.3.4	
			Product Release	**6.4**	
✓	✓		Merge software	Atch 6.1.1-1	
✓	✓		Copy software	Atch 6.1.1-1	
✓	✓		Print documentation	Atch 6.1.1-1	
✓	✓		Prepare Cover Letter	Atch 6.1.1-1	
✓	✓		Assemble components	Atch 6.1.1-1	
✓	✓		Conduct Work Review	6.4.2	
✓	✓		Update Project Indicators	6.4.3	
✓	✓		Conduct Management Review (Release Review)	6.4.4	

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Appendix E

Support Organizations

Support Organizations

Functional Responsibility

This table outlines the various functions performed at the SSC and corresponding offices of primary responsibility.

Function	Office Symbol
Ada	SSC/SSB
Architecture	SSC/SSM
Budget	SSC/RMF
Civil Engineering	SSC/DE
Communications	SSC/SSD
Configuration Management	SSC/SSM
Contracting	SSC/PK
Costs	SSC/RMFC
DDN Connectivity	SSC/SSD
Defense Message Service	SSC/SSD
Fee For Service	SSC/RMFF
Field Assistance	SSC/SSF
I-CASE	SSC/SSI
Manpower	SSC/RMBR
Memorandum of Agreements and Support Agreements	SSC/RMB
Mini/Micro Computer and Life cycle management	SSC/SSM
National Guard and Reserve	SSC/RF
Operations Support	SSC/OPS
Program Objective Memorandum (POM)	SSC/RMF

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Support Organizations, Continued

Functional Responsibility (Cont'd)

Function	Office Symbol
Project Planning	SSC/SSM
Program Control	SSC/QIP
Quality Control (Testing)	SSC/SSQ
Readiness/Plans	SSC/RMMR
Release	SSC/SSQ
Requirements	SSC/RMB
Reuse/Repository (Domain Analysis)	SSC/SSB
Security	SSC/RMMS
Software Engineering Process Group	SSC/QID
Software Process Assurance Group	SSC/QIA
Standard Data Elements	SSC/SSPS
Systems Integration	SSC/SSM
Systems Software	SSC/SSB
Training	SSC/RMS

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Appendix F

Reusable Software Assets Consumption/Production

Reusable Software Asset Consumption/Production

Procedures

The following table outlines the software reusability procedures to be followed by all projects.

✓	Procedures
	Contact the SSC software reuse office to search the Air Force Defense Software Repository System (AFDSRS) for candidate reusable software assets.
	- If you do not have an account to access the AFDSRS database, you may establish an account by completing an Account Request form, Figure F-1, and submitting it to the software reuse office.
	- The software reuse office will provide instructions and guidelines for accessing the AFDSRS database.
	If you find any reusable software assets, capture all identification data and the exact location of each reusable software module for inclusion in the planning document.
	- Identify all documents that apply to the reusable software asset(s).
	If you do not find reusable software assets, you may proceed with software development.
	You must consider all new software development for reuse and incorporation into the AFDSRS.
	Provide a brief description of new software to the software reuse office.
	Follow the most current instructions as directed by the software reuse office.
	If the new software will be entered into the AFDSRS, you must prepare an abstract (Figure F-2) that describes the software.

Additional Information

Additional information can be obtained on-line in the following separate files in the AFDSRS library:

- Reusable Software Component Certification Guidelines for Ada Implementation Component Types
- Ada Quality and Style: Guidelines for Professional Programmers

NOTE: Figures F-1 and F-2 are not available on the LAN version of the SEP. Contact SSC/QIDM, 6-4021, for hard copies.

Figure F1

Figure F2

Figure F2, Continued

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Appendix G

Configuration Management (CM)

Configuration Management (CM)

	Procedures
	Traditionally, configuration management is used to control hardware and software. This paragraph addresses only configuration management of software. ADS managers are required to follow the configuration management principles as stated in AFR 14-1, MIL-STD-973, and MIL-STD-1521B. Configuration management is a structured process for controlling critical documents, functions, and code. This control is necessary to ensure the inputs on all three program parameters (cost, schedule, and technical) are assessed prior to approving a change to a baselined configuration. Configuration management discipline consists of five elements: Planning, identification, control, status accounting, and auditing. The degree to which these five elements are applied will depend on the job at hand. For example, new acquisitions on software production work will include all five elements whereas a small modification may use only identification and control. The program/ADS manager must make these decisions on a case-by-case basis. A description of the five elements is as follows:
	a. Configuration Management Plan (CMP). In order to be successful at doing configuration management, a plan of action must be prepared. The ADS manager will develop a Configuration Management Plan (CMP) according to MIL-STD-973 and AFR 14-1. An example of a generic government CMP is in Sample-G1 at the end of this Appendix. This plan must state what will be controlled, by whom, for what reason, and who must coordinate on and approve changes. The plans must also show how changes will be documented and processed for items (CSCIs) and those which are not CSCIs. A CMP must be developed for each ADS produced and/or maintained at SSC and will be used throughout the life cycle of the software system. For operational ADSs, it is permissible to develop a CMP for a logical group of ADSs or for each functional area where applicable rather than one for each ADS.

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Configuration Management (CM), Continued

	Procedures
	b. Configuration Identification. Identifying the CSCIs which require special attention is crucial for a successful program/project. This can be a difficult decision because exercising excessive project control can lead to inordinate amounts of resources and time being expended to complete the final product. Conversely, if too little control is used, then the risk of providing an inferior product is increased. Some factors to consider when identifying CSCIs are: criticality, high risk functions, new technology items, multiple users/functions/locations, highly interrelated computer programs, and where many changes are expected. For each CSCI, the FD and SS will be controlled by configuration management. However, for items below the system level (for example: subsystem specifications, program specifications, and/or code), the program/ADS manager must identify CSCIs which should be controlled. For some software systems it may be necessary to control a system at a lower level because of high production risk or because it has sensitive areas (for example: programs involving security, or those with fraud, waste, or abuse potential).
	c. Configuration Control. The purposes of Configuration Control are to provide management visibility, prevent unnecessary or marginal changes, establish change priorities, assume prompt actions are taken, and produce adequate documentation. Once system level documents and CSCIs are baselined, changes to them must be controlled. It should be noted here that controlling changes to the three baselines (functional, allocated, and product) are only part of Configuration Management (CM). CM also includes controlling changes to documents which may not be part of a formal baseline or controlling changes to documents long before they become part of a formal baseline. To avoid fragmentations of work during the production process, each change to a baseline CSCI must be reviewed and approved. This ensures that only authorized changes are made and that all participants are aware of them. To speed up the change approval process, changes are divided into Class I and Class II.

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Configuration Management (CM), Continued

	Procedures
	(1) Class I change. A computer software change shall be classified Class I when one or more of the factors listed below is affected: (a) The Functional or Allocated Baseline. (b) The approved Product Baseline including referenced documents that pertain to: 1. Performance including reliability, maintainability, correctness, efficiency, integrity, useability, testability, flexibility, portability, reusability, or interoperability, outside stated tolerance. 2. Interface characteristics (external to the CSCI). (c) Non-technical contractual provisions such as fees, incentives, cost to the Government, and guarantees or deliveries. (d) Other factors. These include Government furnished equipment, safety, other computer software, compatibility with support resources, trainers, or training devices/equipment, delivered operation and contracts, pre-set adjustments or schedules affecting operating limits or performance to such extent as to require assignment of a new software inventory number, skills, manning, training, biomedical factors or human engineering design. (2) Class II change. A change will be classified class II when it does not fall within the definition of a Class I. (3) Class I changes are approved by the project approval official or program manager and Class II by the ADS manager. A Configuration Control Board (CCB) will be used to approve Class I changes. It should be noted that baseline change requests are to be used only during the production process. If a change occurs in the Deployment and Operation Phase, a requirements document such as an CSRD must be submitted through the appropriate channels. The CMP should also specify the internal controls to be used for controlling documents which are not identified as CSCIs.

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Configuration Management (CM), Continued

	Procedures
	d. Configuration Status Accounting. The status accounting function provides traceability of the CSCI baselines and their changes. It also acts as a management tool for accomplishing all related tasks resulting from those changes. The accounting requirement is optional for Management Categories I and II but required for Management Category III. The organization responsible for production, modification, or support of a CSCI will determine the specific data elements, choice of record and report format, and actual record keeping in accordance with the provisions of MIL-STD-973 and AFR 14-1, Configuration Management.
	e. Configuration Auditing. (1) Functional Configuration Audit (FCA). a. The purpose of an FCA is to demonstrate that each CSCI was successfully tested and complies with the software and interface requirements of the functional requirement and design documents, and to perform a thorough technical examination of each CSCI and validate that all changes made to the software code of each CSCI, as a result of OT&E-I and/or OT&E-II, comply with all technical documentation. b. To conduct a FCA, the following inputs are required: 1. Functional requirements document such as the System/Segment Specification (SSS). 2. System Design Documents such as the Interface Requirement Specification (IRS), Operational Concept Document (OCD), and the Software Requirement Specification (SRS). 3. Test procedures such as the Software Test Description (STD) and the Software Test Plan (STP). 4. Test Analysis Reports from OT&E-I and OT&E-II. 5. Minutes of the TRR and all open action items from past reviews. 6. A copy of baseline and data base change requests with their associated status accounting records along with all design problem reports.

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Configuration Management (CM), Continued

	Procedures
	7. List of all tests scheduled to be performed. 8. Results of past tests performed. 9. Other input as specified by the functional requirements and planning documents. c. To conduct the FCA, instruct the audit team members on their responsibilities as outlined in the following paragraphs: 1. Review test procedures and results against test specifications and procedures. 2. Review analysis or simulations when specific parameters were not verifiable during CSCI testing. 3. Review internal documents to verify that there are records of the physical configuration or the version of the CSCI for which test data were recorded. 4. Analyze cases where CSCIs failed to pass quality assurance/requirements and determine why they failed. Ensure corrective actions have been taken. 5. Conduct tests and/or retests to assure quality of the product. 6. Obtain a briefing on each CSCI and discuss with the producer requirements that were not met, solutions to deficiencies, engineering change proposals incorporated and tested as well as those not tested, and CSCI testing in general to include problems as well as successes. 7. Audit formal test plans, procedures, and results for each CSCI and check for completeness and accuracy. Ensure that all discrepancies have been clearly corrected and documented. 8. Audit system evaluation documents to validate test accuracy and completeness. 9. Review all approved engineering change proposals to ensure they were technically incorporated and verified. 10. Review all operational and support manuals to ensure they are accurate and consistent.

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Configuration Management (CM), Continued

	Procedures
	11. Review all past formal review meeting minutes and verify that corrective actions required have been completed. 12. Review and validate CSCI interface requirements and testing. 13. Review data base requirements, storage allocations, data and timing, and sequencing characteristics for compliance with specified and designed requirements. d. A formal report is produced to document the FCA. (2) Physical Configuration Audit (PCA). a. The purpose of a PCA is to conduct a formal examination of each CSCI to ensure it meets all functional and physical requirements. To perform a thorough technical examination of each CSCI and validate that all changes made to the software code of each CSCI, as a result of OT&E-I and/or OT&E-II, comply with all technical documentation. b. To conduct a PCA, the following inputs are required: 1. Functional requirement doucment such as the System/Segment Specification (SSS). 2. List of both approved and outstanding changes to the CSCI. 3. Complete list of shortages in CSCI production. 4. Test procedures such as the Software Test Description (STD) and the Software Test Plan (STP). 5. Test Analysis Report. 6. Test results of all test performed. 7. Operator/programmer/user manuals such as the Maintenance Manual (MM), Computer Operation Manual (OM), and Users Manual (UM) or the Computer System Operator's Manual (CSOM), Firmware Support Manual (FSM), and the Software Users Manual (SUM).

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Configuration Management (CM), Continued

	Procedures
	8. Functional configuration audit report for each CSCI. 9. Findings/status of quality assurance programs. 10. All open action items from previous reviews. 11. Any other documentation as required by the audit team members. c. To conduct the PCA, audit the first article of each CSCI and establish an independent audit team and instruct them on their responsibilities which are basically outlined in the following paragraphs: 1. Review release records and procedures. Record in the minutes of the PCA the differences between the CSCI being audited and its configuration management records. 2. Review test plans, procedures and records as well as product specification records to ensure the product complies with its design requirements. 3. Ensure each CSCI's system evaluation documents are complete and properly formatted. 4. Ensure the discrepancies noted during the FCA on each CSCI have been corrected. 5. Ensure CSCI design descriptions properly reflect labels, references and data descriptions. 6. Ensure each CSCI design description is consistent. 7. Ensure all system documentation is complete and conforms to its data item descriptions. 8. Ensure that approval software coding standards have been used and documented. 9. Certify that each CSCI accepted has been built in accordance with the specifications. d. A formal report is produced to document the PCA.

Sample-G1

Generic Government Configuration Management Plan (CMP)

1. General

1.1. Scope. This document contains the format and content preparation instructions for the CMP required by MIL-STD-973. The information contained herein is intended for compliance by SSC government, as well as, contractor activities performing Configuration Management (CM).

1.2. Applicability. The provisions of this document apply whenever a CMP is required. Although the standard is geared toward contractors, the same CM requirements exist for SSC projects under the Software Engineering Process (SEP).

1.3. Tailoring of Requirements. The selection of the necessary configuration management requirements from MIL-STD-973 to be applied to a specific project will be tailored to suit the life-cycle phase, complexity, size, intended use (including joint and combined interoperability), mission criticality, and logistics support of the Configuration Items (CIs).

2. Applicable Documents

2.1. Government Documents. For the purpose of this document, tailor the list of documents in Section 2 of MIL-STD-973.

3. Definitions

3.1. Definitions Used In This Document. For the purpose of this document, the definitions contained in Section 3 of MIL-STD-973 shall apply.

3.2. Terms Used In This Document. For the purposes of this document the terms System Program Office (SPO), Program Management Office (PMO), Project Office (PO), Automated Data System Office (ADSO and Automated Information Systems Office (AISO) are considered the same.

4. General Requirements

4.1. Content And Format Instructions. The plan shall be prepared on hard copy and/or electronic media using an SSC standard word processor. If a paragraph or subparagraph is tailored out, the following statement shall be added directly following the heading: "This section (or paragraph or subparagraph, as applicable) has been tailored out."

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Sample-G1, Continued

Generic Government CMP

4.2. <u>Organization Of The Document</u>. The plan shall consist of the following:

Cover Page
Record of Reviews and History page
Table of Contents
Section 1. Introduction
Section 2. Reference Documents
Section 3. Organization
Section 4. Configuration Management Phasing and Milestones
Section 5. Data Management
Section 6. Configuration Identification
Section 7. Interface Management
Section 8. Configuration Control
Section 9. Configuration Status Accounting
Section 10. Configuration Audits
Section 11. Contractor Control

5. Detailed Requirements

5.1. <u>Content And Format</u>. The content and format of the plan shall conform to the following paragraphs.

5.1.1. <u>Cover Page</u>. These words shall appear in the following format:

GOVERNMENT

CONFIGURATION MANAGEMENT PLAN (CMP)

for the

[Project Name or Configuration Item (CI) nomenclature and number]

[Date of document - day month year]

5.1.2. <u>Record of Review And History Page</u>. This page shall include the review and approval dates of all changes to the plan.

5.1.3. <u>Table Of Contents</u>. The Table of Contents shall list the title and page number of all titled paragraphs and subparagraphs. The Table of Contents shall then list the title and page number of all Figures, Tables, and Appendices in that order.

continued on next page...

Sample-G1, Continued

Generic Government CMP

5.1.4. <u>Section 1. Introduction</u>. This section shall include:

a. The purpose, scope and specific applicability of the configuration management plan and the project phase(s) to which it applies;
b. A brief description of the system or top level CI, and of the component lower level CIs, using approved CI nomenclature when available, to which the CM Plan pertains;
c. Reference to applicable directives or glossaries containing definitions of terminology and acronyms used in the plan; and
d. A description of the plan's major features and objectives and a concise summary of the project's approach to CM, including any special conditions (such as security constraints, interoperability constraints, non-developmental items, etc.) upon which the approach is based.

5.1.5. <u>Section 2. Reference Documents</u>. This section shall list the specifications, standards, manuals and other documents, including project policy directives, referenced in the Plan by title, document number, issuing authority, revision, and when applicable, change notice, amendment number, and date of issue.

5.1.6. <u>Section 3. Organization.</u>. This section shall describe and graphically portray the project's organization with emphasis on the CM activities, and which shall include:

a. The relationships and integration of the project organization and functional organization;
b. Responsibility and authority for CM of all participating groups and organizations including their role in configuration control boards, and the integration of CM functions with other program activities such as technical reviews;
c. Identification of the project's CM organization and it's responsibilities; and
d. Interfaces between the project's CM organization and the contractor's CM organization.

5.1.7. <u>Section 4. Configuration Management Phasing And Milestones</u>. This section shall describe and graphically portray the sequence of events and milestones for implementation of CM in phase with major project milestones and events, including as a minimum:

a. Release and submittal of configuration documentation in relation to program events (e.g., technical reviews);

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b. Establishment of baselines;
c. Implementation of internal and Government configuration control;
d. Establishment of configuration control boards;
e. Implementation of a status accounting information system and provision of reports or access to the status accounting information; and
f. Conduct of configuration audits.

5.1.8. Section 5. Data Management. This section shall describe the methods for meeting the configuration management technical data (data transfer, media, accessibility, security, etc.)requirements under the computer-aided acquisition and logistic support (CALS) requirements of Paragraphs 4.3 and 6.3, MIL-STD-973.

5.1.9. Section 6. Configuration Identification. This section shall describe the procedures for meeting the configuration identification (CIs, baselines, documentation, etc.) requirements of MIL-STD-973, Paragraphs 5.3.1 through 5.3.6.

5.1.10. Section 7. Interface Management. This section shall describe the procedures for meeting the interface management (CIs, system, Interface Control Working Group, etc.) requirements of MIL-STD-973, Paragraph 5.3.7.

5.1.11. Section 8. Configuration Control. This section shall describe the procedures for meeting the configuration control (CIs, changes, deviations, waivers, baselines, Configuration Control Boards, etc.) requirements of MIL-STD-973, Paragraph 5.4.

5.1.12. Section 9. Configuration Status Accounting. This section shall describe the procedures for meeting the configuration status accounting (CIs, baselines, records, data bases, etc.) requirements of MIL-STD-973, Paragraph 5.5.

5.1.13. Section 10. Configuration Audits. This section shall describe the procedures for meeting the configuration audit (functional, physical, etc.) requirements of MIL-STD-973, Paragraph 5.6.

5.1.14. Section 11. Contractor Control. This section shall describe the methods used by the Government to ensure the contractor's compliance with configuration management (identification, change control, status accounting, audit, etc.) requirements of MIL-STD-973, Section 4.

Appendix H

Cancellation Procedures

Cancellation Procedures

	Procedures
	1. The following actions will be taken before canceling, decommissioning, removing, or relocating the software (ADS) or hardware (ADPE) of a SCS.
	2. The ADS Manager and/or Equipment Custodian will prepare a CSRD, AF Form 3215, to be presented at Program/Special Management Reviews (PMR/SMR) on any ADS or relocation. (The AF Form 3215 is required even if the action is directed by the functional OPR, AFCC, or HQ USAF). The CSRD will contain the rationale/justification for cancellation, decommissioning, removal, or relocation in sufficient detail for the review/approval authority to make the final decision.
	3. The PMR/SMR panel will include the appropriate Standard System Manager, HQ SSC Configuration Manager, and ADS Manager as required for the specific system. When ADPE is involved, the resource advisor will also be a panel member to address equipment discontinuance or reuse and associated dollar reductions. The review panel will review and prioritize related requirements for reuse of the excess equipment, if needed. The AF Form 3215 will provide an audit trail for the ADS and maintain the integrity of the ADPE inventory.
	4. The AF 3215, must designate a project/program manager and provide the authority to begin appropriate actions to accomplish the project/program.
	5. The project/program manager will update the AF 3215 (if necessary) to ensure the following is addressed: a. The office responsible for downloading the system, normally SSC/SS. b. Manuals to be deleted. c. Program and files to be downloaded. d. Manpower impact, if any. e. Where the ADS will be relocated or reused. Identify the potential user of the system and their justification for reuse. f. Related work required of civil engineering, and the agency responsible for submitting the work request. Provide time frame for completion. g. Time frame to notify the contracting office if contractor equipment is involved. h. Milestone schedule for software downloading, equipment removal, etc., at each site involved. i. Agency tasked to provide removal instructions and remove equipment. j. Serviceability statement and agency responsible for serviceability testing. k. Communications line termination, if any. l. Specific device or equipment components involved. List by NSN, part number, and serial number if available.

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Cancellation Procedures, Continued

	Procedures
	6. The program/project manager will also complete the following actions as required by the specific ADS or ADPE involved: a. Prepare a notice of recision in accordance with AFR 5-1, Air Force Publication Management Program. b. Prepare and forward an AFCC Form 2212, Project Summary Sheet, to HQ SSC/SSMS cancel the Data Systems Designator (DSD) and system code. c. Send HQ SSC/SS an AF Form 636 for S1100 systems or an AF Form 2168 for H6000 systems requiring the download. In Block 14, address the rationale for the download and list the manuals to be deleted. In Block 17, list every program and file to be downloaded. d. Delete budget requests. e. Prepare an AF Form 9, Request for Purchase, if ADPE contractor assistance is required. f. To report excess ADPE, prepare and forward an SF 120 to 1st Information Group/GLIA, Washington DC 20330-6340 per DoD-STD 7950.1. g. If ADPE is removed, prepared an AF Form 1261 in accordance with AFR 700-4, Volume I, Chapter 4. File and maintain this form in accordance with AFM 12-50, Disposition of Air Force Documentation. h. If ADPE is relocated and a new custodian or alternate is required at the new equipment location, ensure an AF Form 1261 is prepared to indicate completion of relocation and transfer of FCA responsibility.

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Appendix I

Software Process Assurance (SPA) Plan

Software Process Assurance (SPA) Plan

Purpose

The purpose of this document is to describe the Standard Systems Center (SSC) Software Process Assurance (SPA) Plan. The framework against which the SPA plan is being measured and enforced is the Software Engineering Institute (SEI) Capability Maturity Model (CMM), and "Managing the Software Process", by Watts S. Humphrey, Addison-Wesley Publishing Company, Inc., 1990. The SPA plan consist of three primary components: 1) SPA reviews and audits, 2) SPA documentation, and 3) SPA metrics. This plan is valid for all software development efforts and will not be waived. Submit recommended changes to this plan to SSC/QIA.

a. SPA Plan Reviews and Audits - To ensure the adequacy of the requirement, the Software Process Assurance (SPA) group (SSC/QIA) will have the ultimate responsibility to ensure Center-wide adherence to the approved software development process. This authority for enforcement is the "Software Engineering Process (SEP)". It provides a foundation for all policy, responsibilities, procedures and standards, independent of technology, organizational structure, and specific methods. The SPA plan ensures the following fundamental processes are implemented in concert with the SEP:
   1. All software requirements will be defined and tracked.
   2. All software development will be planned.
   3. All software products will be controlled under configuration management.
   4. All software requirements, plans, and products will be independently verified.
   5. All software developed and released by SSC will follow SSC testing and release procedures.

The SPA group will ensure that program/project managers and appropriate staff, involved in the software development process, are provided orientation on the role, responsibilities, and authority of the SPA group function in fulfilling the terms of the software program/project commitments. Results of the review and audits will be briefed to the program/project managers, and appropriate SSC senior management, when necessary.

b. SPA Plan Documentation. Documentation of all noncompliance items will be maintained under configuration management. Discrepancies/defects identified will be negotiated with the software manager for corrective actions. If necessary, a Program/Special Management Review (PMR/SMR) will be held for SSC senior management to resolve the discrepancy/defect.

c. SPA Plan Metrics. Measurements are made and used to determine the cost and schedule status of the SPA group activities. Examples of measurements include: completion of milestones for the SPA group activities compared to the plan; work completed, effort expended and funds expended in the SPA group activities compared to the plan; and numbers of product audits and activity reviews compared to the plan.

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Software Process Assurance (SPA) Plan, Continued

Responsibilities
The responsibilities listed below identify individuals and organizations that will be affected by the SPA plan: a. SSC/ED or his/her designee will: 1. Designate Automated Data Systems (ADS) managers in writing, who will be responsible to negotiate commitments, develop plans, and all other required activities. 2. Review the following activities on a regularly scheduled basis: a. Requirements b. Program/Project status c. Software Process Assurance activities 3. Receive briefings (as required) on the software process assurance activities. 4. Ensure all software development are in compliance with the Software Engineering Process (SEP). b. Directors or his/her designees will: 1. Ensure all requirements for new systems or modifications to existing systems are reported to SSC/RMB, as directed in the SEP. 2. Ensure compliance with the overall direction of the SEP. 3. Attend SPA activity briefing to the Executive Director. c. ADS/Project Managers will: 1. Develop the required software development plans as specified by the SEP. 2. Identify all requirements for new systems or modifications to existing systems to SSC/RMB as specified by the SEP. 3. Involve the SPA group in the development of plans, commitment and any changes to commitments that directly affect software development efforts. d. SPA group (SSC/QIA), in addition to other responsibilities, will: 1. Ensure that activities documented in the SPA Charter are followed. 2. Participate in the preparation, review, and approval of the program/project plans (e.g., administrative, technical, non technical). 3. Provide briefings to SSC senior management on the status of requirements (number received, number active, and number completed). 4. Monitor and recommend improvements to the SSC software development process, using the SEP as authority. 5. Review and audit software development activities to ensure software process compliance. Results of the reviews and audits will be briefed to the ADS/Project Managers, their SPA representatives, and appropriate SSC senior management, when necessary. 6. Identify and document software development activity deviations and defects in accordance with the SEP. Documentation of all noncompliance items will be maintained under configuration management.

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Software Process Assurance (SPA) Plan, Continued

Responsibilities (Cont'd)

7. Stop software efforts from proceeding to follow-on activities when major process discrepancies/defects are discovered which could produce inferior quality products. Discrepancies/defects identified will be negotiated with the software manager for corrective actions. If necessary, a Program/Special Management Review (PMR/SMR) will be held for SSC senior management to resolve the discrepancy/defect.
8. Brief senior management on the SPA group activities.

Policy

This policy is valid regardless of organizational, management, or procedural changes. All aspects of the SSC software development efforts will comply to the following:

a. Requirements Management. All requirements, received by the SSC, will be stated in clear, verifiable, and testable terminology and subjected to documented procedures for review and approval prior to SSC resource expenditure. All requirements, and changes to requirements, will be reviewed, documented, and approved prior to implementation and will be maintained under configuration management as defined in the SEP document.
b. Project Planning. All software development efforts will have a manager assigned who is responsible for negotiating commitments and developing plans. All plans will be reviewed and approved by a level of senior management and maintained under configuration management as defined in the SEP.
c. Configuration Management. All software development efforts will have a configuration manager designated. All produced and approved software and documentation will be maintained under configuration management, in controlled repositories, for the entire life cycle. Baselines will be audited. All impacted activities will be aware of and knowledgeable of current requirement's baselines and configuration management.
d. Tracking and Oversight. All software development efforts will have an individual identified who is responsible for project performance. Corrective actions will be taken when the software plans are not being achieved, either by adjusting performance or by adjusting the software development plans. All changes and deviations will be subjected to review and approval prior to implementation of the changes.

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Software Process Assurance (SPA) Plan, Continued

Summary
The Software Process Assurance (SPA) involves reviewing and auditing software products and activities to ensure they comply with applicable process, standards, and procedures as defined in the Software Engineering Process (SEP). The primary objectives of the SPA group are to improve the quality of the software development management process and to reduce the cost and time needed to produce quality software products. An SPA group provides the staff and managers with the results of their reviews and audits. The SPA group performing the above functions must be independent of software development and project management. In addition, the SPA group works with the appropriate managers to resolve the noncompliance issues that may arise. SPA is required on all software projects.

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Appendix J

Functional Process Improvement Strategies

Functional Process Improvement Strategies

Introduction

This section provides an overview of the functional process improvement requirement extracted from the DoD 8020.1-M. Functional Process Improvement is an initiative under the OSD Principal Staff Assistants to eliminate the non-essential processes, and to simplify and streamline essential processes. Functional process improvement must be considered prior to the Program Start Review (PSR) as outlined in Chapter 4 of this document.

Functional Process Improvement

The following table outlines stages included in the overall scope of functional process improvement.

Description
Establish the Functional Architecture. The functional architecture documents the scope of the functional area and its functional activities; documents current and future methods, management processes, and data structures; established objectives, performance measure, and performance targets; and reflects decisions on the level of process standardization to be implemented.
Develop the Strategic Plan. The functional area strategic plan defines the major actions that will be accomplished to achieve the functional objectives.
Establish the Process and Data Baseline. Existing methods, management processes, and data structures in each functional activity are reviewed to establish the process and data baselines for process improvement.
Establish the Information System Baseline. Review the process and data baseline to identify the migration system that will serve as the information system baseline for process improvement.
Perform Activity Modeling. Activity modeling is used to identify opportunities to eliminate non-value added processes, to simplify and streamline those processes that do support the mission of the department. *Refer to page J-5 of this Appendix for further information.*
Perform Data Modeling. Data Modeling is used to document the information requirements of the functional activity, to identify reuse requirements and opportunities, to assist in identification of redundant processes, and to guide consistent data administration. *Refer to page J-5 of this Appendix for further information.*
Evaluate and Select Process, Data, and Automated Information system (AIA) Improvement Alternatives. Process improvement analysis leads to evaluation and selection of actions to enhance operation of functional activies. Evaluation decision packages and approval decision packages are integrated document sets providing functional, technical, and economic analyses of proposed process improvements. Each improvement decision contributes to implementation of strategic plans and functional objectives.

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Functional Process Improvement Strategies, Continued

Functional Process Improvement, (Cont'd)

Description
Prepare the Functional Economic Analysis (FEA). An FEA is the principal documentation in an integrated document set that makes up decision package. Preliminary FEA's are used by Functional Activity Program Managers to evaluate alternatives and select a preferred course of action. Final FEA's are used to secure OSD Principal Staff Assistant approval to proceed with execution.
Prepare the Data Management Plan (DMP). The migration system data management plan addresses all the data administration actions related to a specific migration system. It is a system-specific integration document that is maintained for the life of the information system it supports.
Prepare the Technical Management Plan (TMP). The migration system technical management plan addresses all the information system development and modernization actions related to a specific migration system. It is a system-specific integration document that is maintained for the life of the information system it supports. It identifies system-specific schedules, costs, benefits, and risks. It includes (or appends) necessary life cycle management (DoDD 7920.1), reference (g)) documentation.
Execute the Approved Process, Data, and System Changes. The Functional Activity Program Manager updates and executes the implementation plan that defines the tasks required to first prototype (if prototyping was not done prior to approval) and then broadly implement the approved process changes.
Develop Information Systems to Support Process Improvement. A disciplined life cycle management approach is used to manage DoD information and DoD information systems from inception through discontinuance. Information system development and operation is based on a model of information needs which encompasses the creation, collection, processing, transmission, use, storage, dissemination, and disposition of information. All information systems in DoD are subject to the Department's life cycle management policy and procedures. *Refer to DoD 8020.1-M, Chapter 15 for further information.*
Revise Baselines and Seek Further Improvement Opportunities. Each successfully implemented set of improvements defines a new process baseline, a new data baseline (if data requirements were changed), and a new information system baseline (if system support requirements were changed). Functional objectives are reviewed and revised as appropriate. The Technical Integration Repository is updated to reflect the new information system baseline. The updated baselines and objectives become the starting point for further process improvement.

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Functional Process Improvement Strategies, Continued

Functional Process Improvement, (Cont'd)

Description
Conduct Defense Information Management (IM) Program Reviews. Although OSD Principal Staff Assistants exercise full responsibility, authority, and accountability for management of their functional areas, oversight processes exist to ensure effective and efficient accomplishment of the DoD mission by all officials of the Department. For the Defense information management program, the DoD Senior IM Official is responsible for development, implementation, and oversight of standard DoD-wide IM policies, procedures, methods, models and tools, as well as appropriate IM performance measures and assessments.

Note
As previously mentioned, Activity and Data Models are the two stages of Functional Process Improvement that will be discussed further in this document. Refer to DoD 8020.1-M for additional information on these and all stages identified in this Appendix.

Functional Process Improvement Strategies, Continued

Modeling

The following table describes the role of modeling.

Description
A model is a tool to assist functional managers in understanding their current environment, and in improving that environment in an orderly manner. Through modeling, a rigorous and structured methodology is applied to define and document the baseline ("as is") and target ("to be") processes and information requirements of a functional activity. The Functional Activity Program Manager establishes an interdisciplinary joint functional/technical team, which applies a DoD standard methodology called IDEF (Integrated DEFinition language, pronounced I-Def) to develop activity models and data models, using procedures developed by the Director of Defense Information, and software tools available from a variety of sources including the I-CASE tool set.
Note: "As Is" and "To Be" Models must be completed prior to the Needs Analysis process (see diagram on next page).

Activity Modeling

The following table outlines a description of Activity Modeling.

Description
Activity models (or process models) of the processes that make up the functional activity show inputs, outputs, controls, and mechanisms through which the functional activity is (or will be) conducted. IDEF0 (IDEF Zero) is the DoD standard methodology used for activity modeling. Activity modeling procedures and methodology are discussed in further detailed in Chapter 8 and Appendix E of DoD 8020.1-M.

Data Modeling

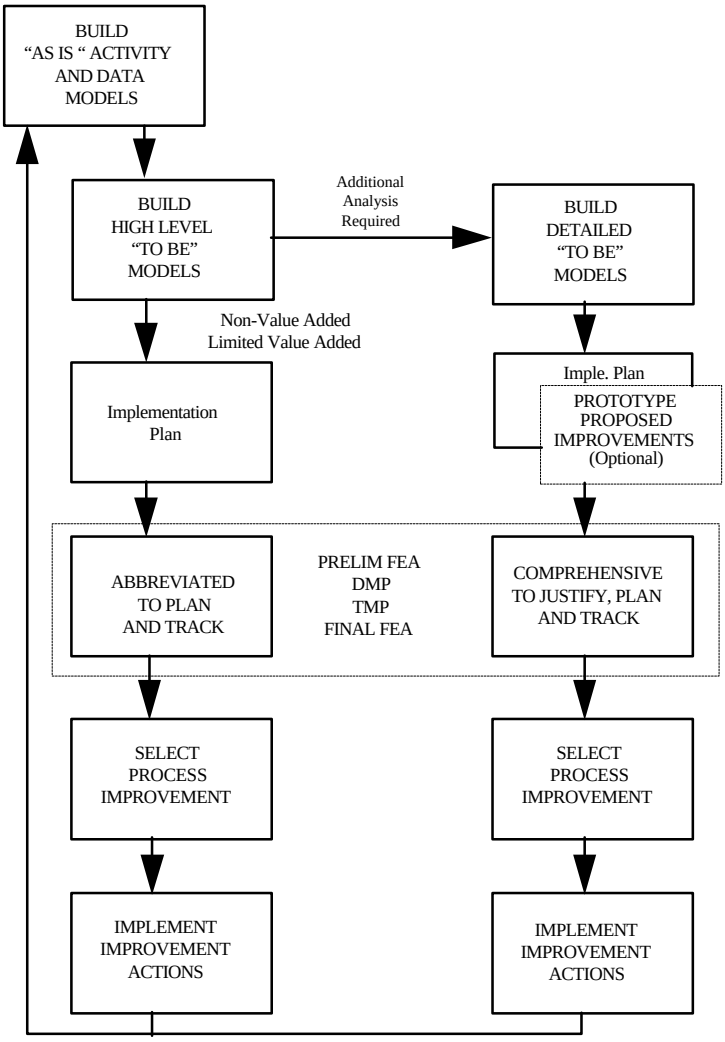
The following table outlines a description of Data Modeling.

Description
Data models define the entities, their attributes, their relationships, and the integrity constraints through which the information created and used by the functional activity are managed. Data models are important elements of functional process improvement, and are also a primary source of information for DoD-wide data standardization. IDEF1X (IDEF One X) is the DoD standard methodology used for data modeling. Other data modeling tools are also used to support the DoD data administration program. Data modeling is discussed in further detailed in Chapter 9 and Appendix F of DoD 8020.1-M.

Functional Process Improvement Strategies, Continued

Context

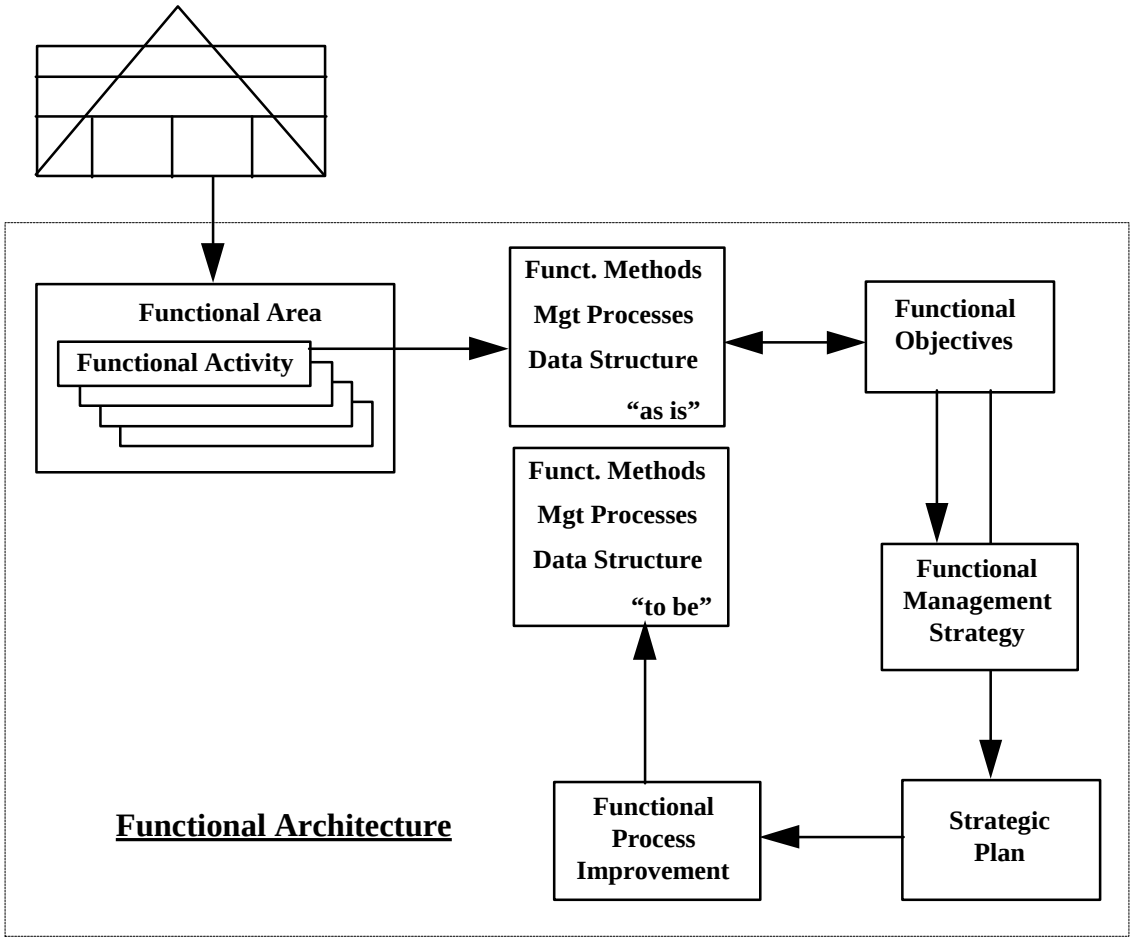
This diagram illustrates the more difficult phase of process improvement when all the non-value added and limited value added processes have been reviewed and eliminated or simplified. This phase uses comprehensive activity and data modeling to develop detailed proposals for process streamlining. Optional prototyping is used to determine functional and technical feasibility and formal evaluation is more rigorous.



Functional Process Improvement Strategies, Continued

Context

This diagram illustrates the parts of the Functional Architecture as they are developed and managed as a framework for functional process improvement.



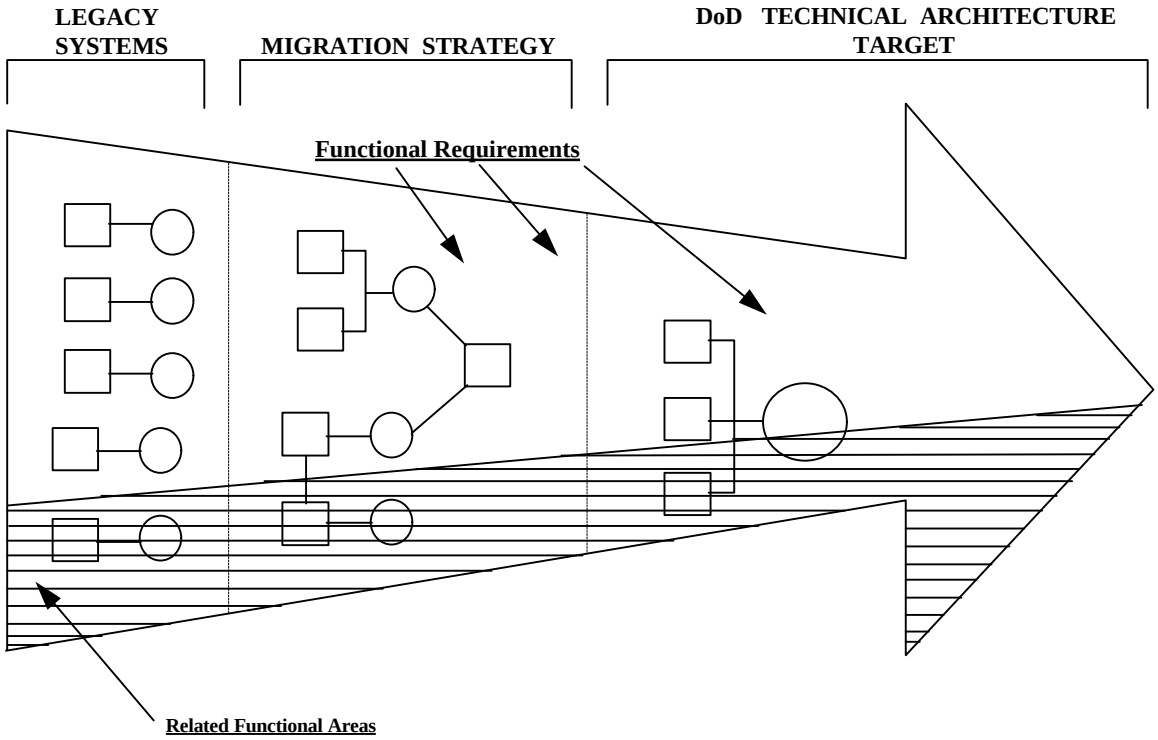
Functional Architecture

The following table outlines the description of a Functional Architecture.

Description
The functional architecture defines the functional objectives that the "to be" environment will support, and the functional management strategy to be followed in accomplishing process improvement. It also defines both the baseline "as is" environment and the target "to be" environment for the functional area. Initially, this is done at a very macro level (high level) of aggregation. As process improvement proceeds, the functional architecture evolves to greater degrees of detail and precision.

Functional Process Improvement Strategies, Continued

Context This diagram illustrates a Corporate IM System Implementation.



IM Systems The following table outlines the description of the IM Systems functional management process.

Description
"Corporate IM systems" are those information systems within a corporate IM functional area which have been formally designated by the OSD Principal Staff Assistant as either "migration systems" or "standard systems" based on application of the functional management process. Designation as a corporate IM system is a result of applying the functional management process, not a delimiter of the process to which the Defense IM program and the corporate IM initiative are applied.
The Defense IM functional management process requires early identification of a functionally adequate standard information system baseline from among existing legacy systems to support the approved process and data baselines.

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Functional Process Improvement Strategies, Continued

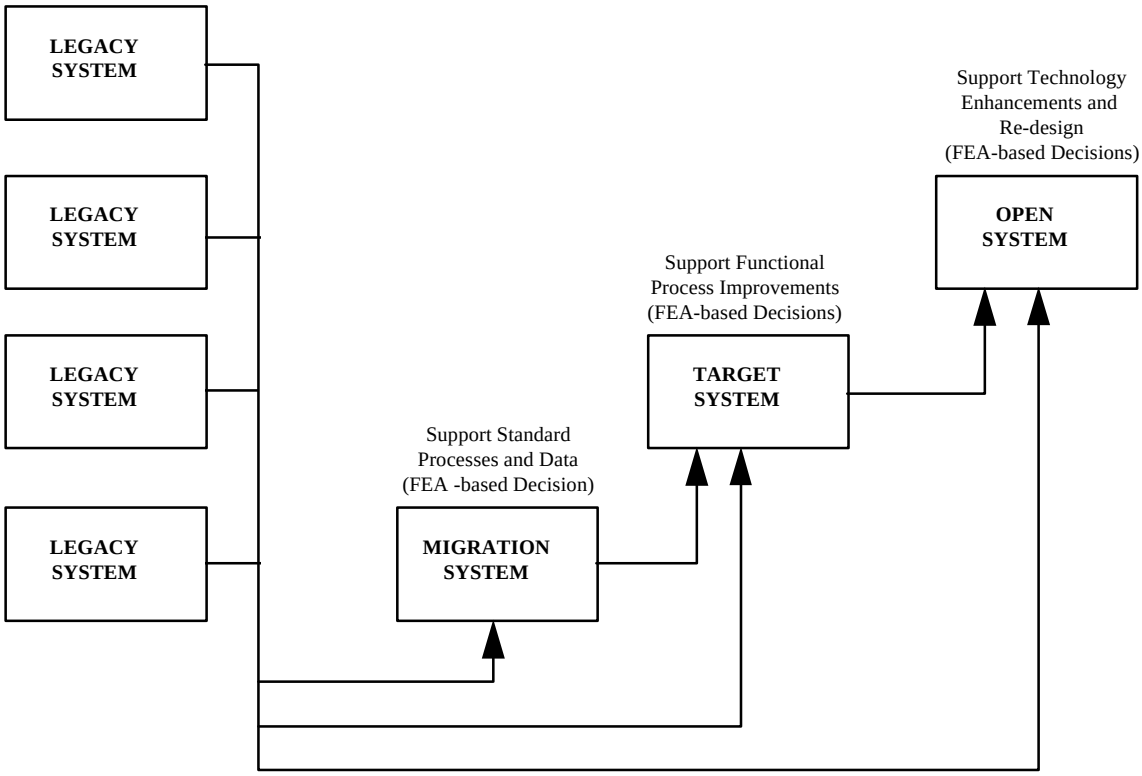
IM Systems, (Cont'd)

Description
Automation support requirements identified while establishing the process and data baselines provide the functional criteria that information systems must satisfy to be selected as the system baseline. The information system baseline may consist of one existing system, multiple systems, or parts of one or more systems. If no system is acceptable, then comprehensive process improvement analysis is undertaken to define requirements for an information system new start.
Costs and benefits of potential baseline systems are evaluated through functional economic analyses. Implementation planning defines the time-phased migration strategy through which the functional activity will rapidly transition operations from legacy systems to the information system baseline. Subsequent information system changes can then be implemented at lower cost and lower risk than would be the case if functionally equivalent, but technically unique, changes had to be implemented across multiple systems supporting the same process as illustrated in the diagram above.
Note: The migration option of moving directly from existing legacy systems to an open system environment is rarely feasible. Incremental and evolutionary change through functional process improvement and technology insertion, justified by functional economic analyses, offers the strongest probability for successful implementation as illustrated in the diagram on the following page.

Functional Process Improvement Strategies, Continued

Context

The following diagram illustrates an Information System Migration.



Migration System

The following table outlines a description of a Migration System.

Description
A "migration system" is an existing information system within a corporation IM functional area that has been selected and designated as the standard system to support standard processes for a functional activity. However, a migration system has not yet undergone transition to the standard technical environment and standard data definitions being established through the Defense IM program, and must "migrate" toward that standard environment. Migration systems can be designated at DoD-level (for DoD-wide application) or at DoD Component-level (for DoD Component-wide application). If the functional activity has DoD-level standard processes, then it should be supported by a DoD-level migration system. If the OSD Principal Staff Assistant's functional management strategy calls for DoD Component-level standard processes, then a DoD-level migration system may still be appropriate.

Functional Process Improvement Strategies, Continued

Standard System

The following table outlines a description of a Standard System.

Description
A "standard system" is a migration system within a corporate IM functional area that has completed the transition to DoD-wide standard technical environment (defined by the DoD technical architecture and the Technical Reference Model) and standard data definitions.

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Appendix K

Logistics/Computer Resource Planning

Logistics/Computer Resource Planning

Pre-development Phase
A. Computer Resources/Logistics Requirements Identification 1. Review available program direction documentation, e.g. the CSRD, ORD, and PMD. a. Identify the scope of the operational requirement, i.e. needed system has: both peacetime and wartime requirements; has multiservice use; has stand-alone/network requirements; has desired Reliability, Availability, and Maintainability (RAM) requirements; degraded, emergency, and backup requirements, training requirements, and etc. b. On the basis of the requirements study, identify computer resources needed to provide required capability. Per DODI 5000.2, Part 6, Engineering and Manufacturing, Sec. D., Paragraph 2.a. (1-2), computer resources include hardware, firmware, software, documentation, support services, supplies, and spare parts. They may be special purpose equipment or nondevelopmental items built to meet DoD-unique specifications and commercial off-the-shelf, general purpose, automated data processing equipment or services. Additionally, this includes the procedural and technical documentation produced by the Air Force or the contractor(s) to operate and support these resources. c. On the basis of the requirements study and projected computer resources required, identify user supportability needs. Identify the integrated logistics support (ILS) elements, e.g. maintenance needs, supply support needs (spares and consumables), manpower needs, training needs, and etc., that must be addressed within the scoped operational requirements.
B. Logistics Support Analysis (LSA). On the basis of the identified supportability needs, perform a tailored LSA as directed by DODI 5000.2, Part 6, Sec L.4.c. (4), AF Sup 1. The applicable LSA tasks tailored for NDI/COTS are recommended in DOD Nondevelopment Item (NDI) Acquisition Handbook, Standardization Document - 2 (SD-2), October, 1990, Appendix "D". (MIL-STD-1388-1A outlines LSA tasks for weapons system acquisitions. However, LSA for NDI/COTS is not as extensive as for weapons system acquisitions).

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Logistics/Computer Resource Planning, Continued

1. For NDI/COTS acquisitions, Contractor Logistics Support (CLS) is the preferred support concept per DODI 5000.2, Part 6, Sec. D.3.h. (2) (c) and Sec. L, para 4c (1) - (2). Therefore, the primary LSA effort will address CLS. The recommended tasks are: Tasks 201, 203, 402, 403, and 501. Tasks 201 and 203 are applicable to this phase. Tasks 402 and 403 are applicable to the Development Phase. Task 501 is applicable to the Post-Development Phase.
   a. Task "201" - Market investigation/identification of commercial candidate items (Survey the potential contractor's/product's ability to meet ILS requirements within the operational scope). This survey will cover as a minimum:
      (1) General performance specifications of candidate items.
      (2) Available test data for candidate items.
      (3) Market place acceptability of candidate items.
      (4) Candidate items' manual(s) adequacy.
      (5) Potential vendor maintenance support capability.
      (6) Potential vendor supply support capability.
      (7) Potential vendor training availability/adequacy.
      (8) Potential vendor impact on other ILS elements as applicable.
      (9) Price range of candidate items including the support package outlined above.
      (10) Available list of references for potential vendors.

Note: Can be applicable to both hardware and software as directed by the program manager.

   b. Perform task 203, a suitability analysis, i.e. a comparative analysis, of existing government equipment/support capabilities vs the data gathered in LSA task 201.
2. In cases where CLS may not be the preferred support concept, consult DOD NDI , Acquisition Handbook, SD-2, October, 1990, chapter 8 and Appendix "D" for detailed ILS planning and LSA taskings.

C. Develop a proposed supportability strategy using LSA results and needs analysis.
1. Propose a hardware system. Support concept will be one of the following:
   a. CLS using existing SSC requirements contracts with tailored CDRL / CLIN mods;
   b. CLS using new RFP with tailored CDRLs/CLINs (Use SSC contracts as model).
   c. Other support concept IAW the DOD NDI Acquisition Handbook.
2. Propose a Software Support Concept selected from AFR 800-14, Attachment 8.

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Logistics/Computer Resource Planning, Continued

D. Commence first iteration drafts of two interrelated documents: the Integrated Logistics Support Plan (ILSP) and the Computer Resources Life Cycle Management Plan (CRLCMP). The CRLCMP will be developed in conjunction with the ILSP per DODI 5000.2, Part 6, Sec. D, Para 3.a.(3). This will ensure hardware and firmware/software supportability are properly integrated and addressed during development. The plans will cross-reference each other. In this phase, these plans contain the identified system hardware and computer resources requirements.

1. The ILSP will follow the format outlined in DOD 5000.2 - M, AF Sup 1. It will discuss the applicable ILS elements within the CLS concept for the hardware and software interface from a hardware point of view. The ILS elements will be discussed using the analyzed LSA data extracted from this phase. (Don't forget that the LSA is iterative through the pre-development, development, and post-development phases). It will cross-reference the CRLCMP when/where the software interface discussion is applicable. Plan should contain the schedule milestones for each applicable ILS element.
2. The CRLCMP will follow the format outlined in AF Sup 1/5000.2-M. However, it must be tailored to fit NDI/COTS acquisitions. It will outline computer resource planning from a firmware/software point of view. It will cross-reference the ILSP when/where the hardware interface discussion is applicable. Plan should contain the schedule milestones for each applicable computer resource element.

E. Assist the program manager (PM) in forming and convening an Integrated Logistics Support Working Group (ILSWG). The active participants should include the program office, applicable matrix organizations, users, and other supporting organizations such as AFOTEC. The ILSWG is chartered to be a forum to affirm, validate, and coordinate externally at the working level, proposed ILS planning strategy and progress within the program. The ILSWG should meet as needed to discuss supportability planning progress and issues. Because of integration impact, there will be need for the ILSWG to meet jointly with the Computer Resource Working Group (CRWG) described below.

F. Participate as a primary member of the CRWG formed and convened by the PM, (co-chair in absence of PM, when meeting jointly with ILSWG). The active participants should include the program office, applicable matrix organizations , users , and other supporting organizations such as AETC and AFOTEC. The CRWG is chartered (see AFR 800-14, Attachment 10) as a forum to affirm , validate , and coordinate externally at the working level, proposed computer resource planning including firmware/software and life-cycle planning strategy and progress within the program. Because the CRWG planning and ILSWG planning will have integration impact on each other, there will be need for the CRWG and ILSWG to meet jointly to discuss and work out supportability issues.

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Logistics/Computer Resource Planning, Continued

G. Review the proposed supportability strategy derived from the requirements analysis and the LSA and the proposed drafts of the ILSP with the ILSWG and CRLCMP with the CRWG.
H. Provide the CRWG and ILSWG coordinated supportability strategy recommendations to the PM.
I. Use the information in the CRLCMP and the ILSP to provide required input to related documents/plans, e.g. the Operational Requirements Document (ORD), and the Test and Evaluation Master Plan (TEMP). It is very important that all of these documents agree regarding the identified program requirements and acquired capabilities needing test and evaluation.
J. Coordinate the CRLCMP and the ILSP as follows: a. Applicable matrix agencies to the Director's level b. Within program office to System Program Director's level c. Standard System's Director's level d. External coordination to the applicable supporting and operating commands IAW AFR 800-14, chap 3, para 3.b(2).
K. Review the proposed hardware (ILSP) and computer resources (CRLCMP) supportability strategy in the Systems Requirements Review (SRR).
Development Phase **(Computer Resource and Supportability Planning)**
A. Receive the approved acquisition (includes supportability) strategy from the PM. **Note:** It may be necessary to delay the HW decision until the SW design is mature enough to minimize the risk of inadequate processor throughput and memory capacity.
B. Proceed with Computer resource planning based on this strategy (DODI 5000.2, Part 6, Sec D, Para 3.b. (1-4). This planning must be accurately reflected in the CRLCMP. 1. Establish firmware/software supportability milestone schedules. Plan, coordinate, monitor and track milestone accomplishment using planning actions described below. 2. Develop system acquisition strategies and schedules which integrate software development with the development of other system components; 3. Address the requirements for software development tools, the software development environment, and the software integration environment; a. Address performance, schedule, cost, and post-deployment support; b. For all deliverable software, apply the guidance outlined in DoD-STD-2167 and DoD-STD-2168 as tailored to the application. c. Review planning progress with the CRWG. d. Review planning progress including CRWG commentary with the PM. 4. Update the CRLCMP with the approved computer resource planning.

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Logistics/Computer Resource Planning, Continued

C. Proceed with ILS planning IAW the approved supportability strategy. Use the data derived from the LSA tasks 201 and 203 analysis, the feedback from the working groups and the PM comments, as the planning basis.

1. Accomplish the following general ILS planning :
   a. Establish applicable ILS element milestone schedules. Plan, coordinate, monitor and track milestone accomplishment using planning actions described below.
   b. Based on the data results of the LSA tasks 201 and 203 analysis accomplish the following LSA tasks in this phase:
      (1) Task "402" - Determine impact of COTS on existing support (early fielding analysis).
      (2) Task "403" - Assess support sources after production ceases (post production support).
   c. Using the LSA, accomplish hardware maintenance and supply support planning. Outline the hardware maintenance and supply support scenario. Indicate the level at which specific repair or maintenance will occur. Indicate the level of user involvement, i.e. preventive maintenance, testing and reparable part identification, removal and replacement or preventive maintenance actions only. Indicate the support resources (support equipment and spares) needed for the maintenance scenario. Normally, the specific aspects of this maintenance and supply support planning is addressed under the CLS concept (see paragraphs 2 and 3. below).
2. CLS using existing SSC contracts . When the requirements contracts are used as sources for the system hardware acquisition, the results of the LSA should be used to assure that the provisions of the requirements contracts are adequate for support. If adjustments are necessary, refine/tailor the existing CLS to fit the user's needs. This refinement/tailoring will be accomplished by tailoring the applicable data item descriptions (DIDs) in the contract data requirements list (CDRL) or using modifications to CLINs in the existing contract.
3. CLS but New Request for Proposal (RFP) required. Prepare the logistics input for sections "C", "L", "H" (Warranty management), and "M" of the proposed RFP. Use the guidelines in the DOD NDI Acquisition Handbook, SD-2, October, 1990, chapter 5. Be sure to consider carefully the specific recommendations for developing each applicable section. The results of the LSA should be used to assure that the provisions of the new RFP adequately address the support requirements. Consider/Adapt the CDRLs used on the requirements contracts as models for CDRLs in the new RFP. Participate in the program office murder board for the proposed RFP. Change/Update logistics input accordingly.
4. In cases where CLS is not the approved support strategy, consult DOD NDI Acquisition Handbook, SD-2, October, 1990, chapter 8 and Appendix "D" for detailed ILS planning and LSA taskings.
5. Review/coordinate planning progress with the ILSWG.

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6. Review planning progress including ILSWG commentary with the PM. 7. Receive approved system hardware decision and planning from the PM. 8. Update the ILSP with the approved planning. 9. Participate in the source selection process as directed by the PM. D. After software design maturity and the system hardware decision is made, place special emphasis on training milestone schedule. There should be sufficient ILS and computer resource planning data to allow detailed training planning at this time. Use the updated ILSP and CRLCMP to define the needed training requirements. Coordinate with the contractor/the AETC as required. Jointly, prepare a system training plan (STP) IAW AFRs 50-8/50-11 that establishes procedures and responsibilities in conducting training for the acquisition program. Use the CRWG and ILSWG as forums to insure the users are informed and are satisfied with training planning, schedule and progress.
E. If the PM approves, review planned supportability and applicable documentation within the functional baseline at the System Design Review (SDR).
F. Continue computer resource/logistics planning and documentation updating as the acquisition progresses toward the product baseline. Ensure changes in computer resource planning are updated in the CRLCMP. If these changes have impact on the hardware interface, the ILSP must be updated, also.
G. Continue to coordinate changes/updates with the appropriate working group(s).
H. If the PM deems it necessary, review the updated computer resource/logistics planning and documentation at the Critical Design Review (CDR) .
I. Repeat the documentation coordination cycle described in Part I. Paragraph I. above as required for changes/updates. Insure copies of the approved CRLCMP and ILSP are distributed to all.
Post-Development Phase **(Supportability Testing and Evaluation and System Implementation)**
A. LSA task 501 is ready to be accomplished in this phase. Task "501" - Assess Supportability via Test and Evaluation. The product baseline, i.e. both the hardware and software configurations have been developed. The software and hardware interface should be undergoing testing and evaluation IAW the TEMP. Changes to SW/HW which would effect fielded systems must be assessed from supportability view, e.g. impact to delivered HW and spares.
B. Continue computer resource/logistics planning and documentation updating IAW configuration changes to product baseline, if any. Ensure changes in computer resource planning are updated in the CRLCMP. If these changes have impact on the hardware interface, the ILSP must be updated, also. Insure new pages reflecting the approved changes are sent to the field, as soon as possible.
C. Assist the program office in system implementation. Coordinate and work with the program office OPR to provide logistics responsibility input to the system implementation plan.

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Logistics/Computer Resource Planning, Continued

D. Ensure Users are trained and ready in sufficient lead-time for system implementation. Use the CRWG and ILSWG as forums to ensure the users are informed and are prepared to assist in meeting the system implementation schedule at the applicable bases.
E. Allow adequate lead-time from system implementation in the field to pay special attention to delivery of hardware/software releases to the field. Ensure that the contractor does not deliver HW systems too early, but rather the deliveries are coordinated between the program office and the user IAW scheduled implementation. Ensure that contractor deliveries are made to the correct locations IAW scheduled implementation. Ensure that early SW releases, if any, will work on incoming/fielded systems.
F. Assist the Standard Systems Data Manager in assuring that the contractor (s) comply with the required deliverables.

Appendix L

Software Program Life Cycle Strategies

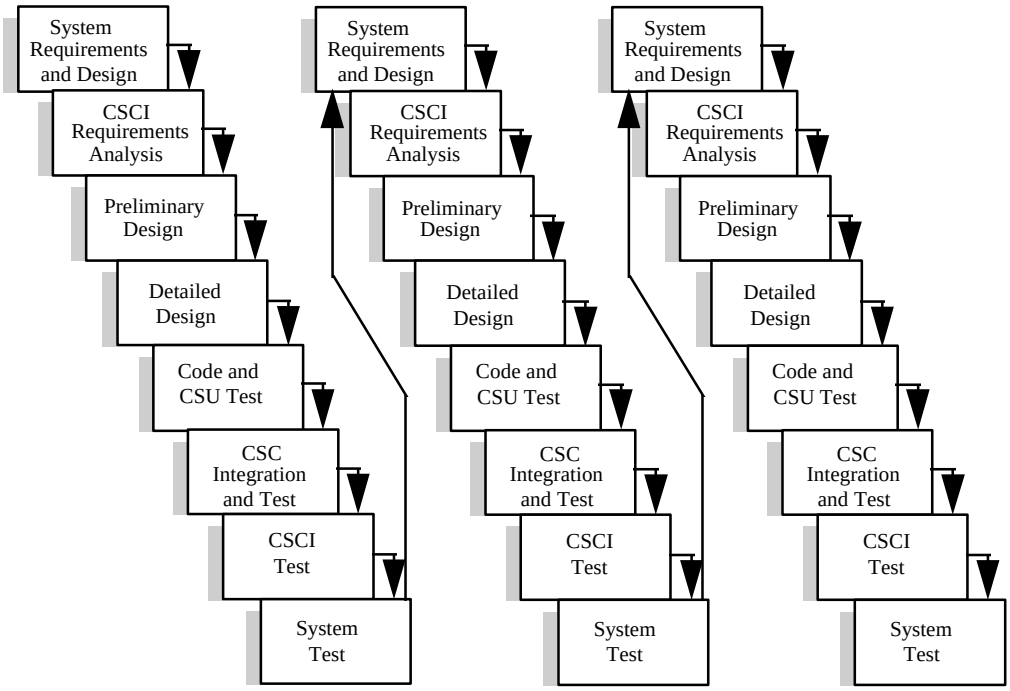
Software Program Life Cycle Strategies

Introduction

There are many program strategies for implementing the software life cycle. The *Evolutionary, Incremental, Spiral, and Ada Spiral Life Cycle Strategies* are outlined in the following pages. The *Grand Design (Waterfall)* and *Prototyping* methods will also be described in this section of the SEP. The program/project manager should select a software life cycle strategy based on the nature of your program and application, the methods and tools to be used, and the controls and deliverables that are required. The selected life cycle strategy will be approved at the Project Planning Management Review (*Refer to AF Pamphlet 63-115, Final Draft, Nov 1993*)

Context

This diagram illustrates **Evolutionary Development** at the CSCI level.



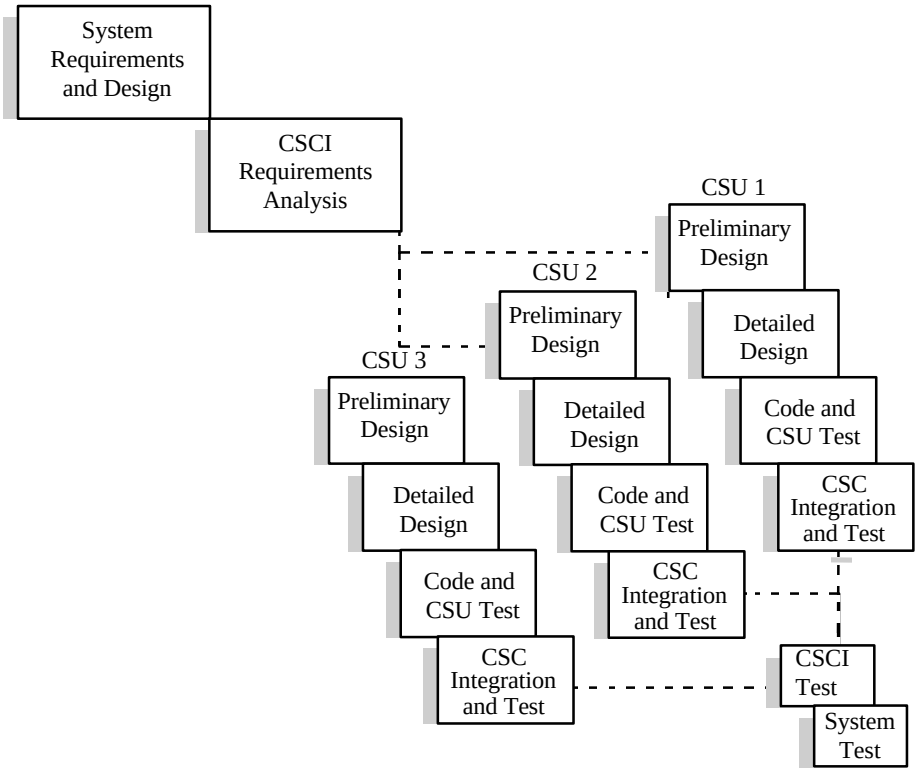
Evolutionary Development Strategy

The following table outlines the description of an Evolutionary Development strategy.

Description
This strategy involves developing an operational product early, then successively developing more refined editions of the product. It differs from prototyping in that a fully operational and documented initial product is generated. This initial core capability meets minimum essential requirements and is characterized by a flexible, modular structure. It also includes provision for the evolutionary addition of future function and changes as requirements are further defined. Evolutionary developments are conducted within the context of a plan for progress towards an ultimate capability. An evolutionary program strategy requires the development of increments of software that are demonstrated to the customer. As the program progresses toward completion, the customer can be involved through the entire development process.
Evolutionary program strategies are particularly suited to situations where, although the general scope of the program is known, a basic core of customer functional characteristics can *not* be defined and detailed system requirements are difficult to qualify or articulate. This is usually the case with software-dominated decision support systems that are highly interactive and have complex human-machine interfaces. This strategy is best employed for medium to high-risk programs (i.e. C3I, weapon, high cost/high resource consumption, high security, and extensive external interfaces systems). While this method does deliver an early operational capability, the first edition of the product takes more time and effort than in prototyping.
NOTE: The Evolutionary Development Strategy is **preferred** over the Incremental Development Strategy.

Context

This diagram illustrates an **Incremental Development** strategy at the software component level.



Incremental Development Strategy

The following table outlines the description of an Incremental Development strategy.

Description
This method involves developing software in groups of functional capabilities. Software is partitioned into increments, whose development is phased over the total development cycle. It allows the customer to investigate part of the product before the entire product is completed.

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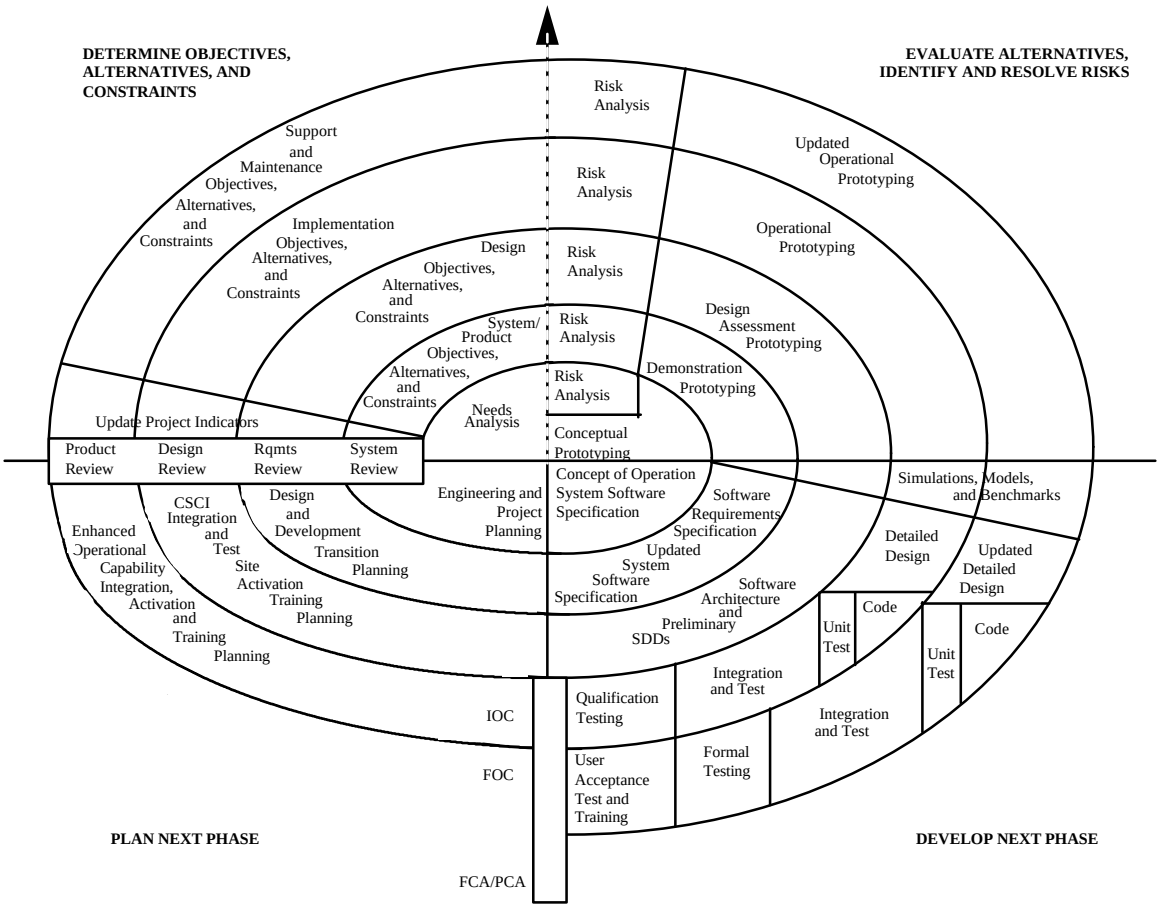
Incremental Development Strategy, (Cont'd)

Description
Incremental program strategies are characterized by acquisition, development, and deployment of an initial core capability, worth fielding in its own right, that is subsequently upgraded or augmented to satisfy the total scope of the stated customer requirement. The number, size, and phasing of the increments leading to program completion must be defined by the program manager in consultation with the customer. An incremental program strategy is most appropriate for low to medium risk programs (systems that do not fall in the high risk category; see the Evolutionary Development Strategy for a list of high risk systems); or when customer requirements can be *fully* defined, but assessment of other considerations (e.g., risks, funding, schedule, size of program, early realization of benefits) may indicate a phased approach is more prudent.
While the incremental development diagram shows incremental development in conjunction with the grand design approach, it works equally well with other methods, such as prototypying or evolutionary development. It allows the customer to evaluate part of the completed product before the entire product is integrated and tested. It also promotes early discovery of problems and facilitates corrections.
NOTE: The Incremental Development Strategy should **rarely** be used at the SSC.

Context

This diagram illustrates an enhanced version of a **Spiral** (implemented by the spiral model) strategy.



Spiral Development Strategy

The following table outlines the description of Spiral Development strategies.

Description
Spiral development (implemented by the spiral model), developed by Barry Boehm, provides a risk-reduction approach to software development. In spiral development, the radial distance is a measure of effort expended, while the angular distance represents progress. It combines features of both the grand design and the prototype approaches to software development.

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Spiral Development Strategy, (Cont'd)

Description
Spiral development emphasizes evaluation of alternatives and risk assessment. These are addressed more thoroughly than with other strategies. A review at the end phase ensures commitment to the next phase or identifies the need to rework a phase if necessary. The advantages of spiral development are its emphasis on procedures, such as risk analysis, and its adaptability to different development approaches. If spiral development is employed with demonstrations and baselining/configuration management, you can empower continuous customer buy-in and established a disciplined process.
The following is a description of the **Ada Spiral Model Environment**: An adaptation of Boehm's spiral model, developed by TRW, is illustrated in the spiral model diagram (above). It is a development environment as it constitutes a model and a tool combination. It uses Ada as a life cycle language and offers the ability to have continual touch and feel of the software product (as opposed to paper). It is a demonstration-based process that employs a top-down incremental approach, resulting in early and continuous design and implementation validation. The advantage of this environment is that not only does it build from the top down, but because Ada supports partial implementation, the structure is automated, real, easily evolved, and each level of development can be demonstrated. Each build and subsequent demonstration validates the process and structure. Each level can serve as a formal baseline that can be controlled.

Context See Figure 5.4.2-2 for an illustration of the **Prototyping** strategy for the SEP.

Prototyping Strategy The following table outlines the description of a Prototyping strategy.

Description
Prototyping is another software development technique that allows the customer to look at alternatives. Often it is not possible for the customer to articulate requirements in depth. By showing the customer alternatives to solving a problem, valuable time and resources can be conserved. An example of an application for prototyping is the software that drives various displays either in a cockpit or on a desk top computer. Given the number of ways and the frequency of displaying graphical and textual information, the customer's involvement through observation of numerous alternatives is essential in satisfying the requirement.
One variation of prototyping is the development of a working prototype during requirements analysis, instead of writing a specification. This enables customers to evaluate whether requirements are being met and encourages customer involvement. Another prototyping method is to quickly proceed through the entire development process, have customers evaluate the product, then develop the operational product using the waterfall approach. Boehm refers to this practice as the "build it twice" approach.
Prototyping can result in substantial cost and schedule savings as it identifies requirements difficulties early in the program. However, it is not suitable for all applications. Care must be taken not to allow the customer to implement a prototype designed for demonstration purposes. Prototype software should rarely be implemented in the final system. It can, however, evolve into the final fielded version. A variant of this method is evolutionary prototyping, where successive refinements of a prototype are developed.

Advantages The following table outlines some advantages of prototyping.

Advantages
a. Provides a method and technique to design a system that satisfies previously undefined customer requirements through the use of a working model of the system. Clarifies and verifies specifications for the system. b. Expedites customer and developer interaction, affording an opportunity to create, demonstrate, and modify a proposed system before obligating costly resources.

Disadvantages The following table outlines some disadvantages of prototyping

Disadvantages
a. Prototypes may be produced too fast, resulting in too little analysis during the original requirements phase; alternative solutions may not be researched thoroughly. b. Quick-fix methods may override the opportunity to research and innovatively solve underlying problems. c. The failure to develop an overall, detailed system plan before prototyping individual modules can affect system integration, especially where large systems are comprised of smaller prototype individual pieces. d. A prototype may be decreed "operational" before completing the development cycle. This can create high maintenance costs, and error handling and interface problems. e. Documentation is usually lacking if a prototype system evolves into a production system.

Considerations The following table outlines some things to consider when prototyping.

Considerations
a. Effective management of resources can present a problem to managers. Prototyping has a tendency to shift away from the standard development processes and assigns new roles to analysts, programmers, and technicians in dealing with customer and systems development procedures. Instead of the traditional customer-to-analyst-to-programmer flow, bi-directional communications between the customer and application specialists are required. b. Successful prototyping is dependent upon a strong project leader who possesses knowledge of the system and has prototyping skills. A large investment of time from the most knowledgeable customers is required.

Grand Design (Waterfall) Strategy The following table outlines the description of a **Grand Design (Waterfall)** strategy.

Description
This is an older program strategy, often implemented by using the *waterfall model*, uses DoD-STD-2167A terminology. This strategy was conceived during the early 1970s as a remedy to the *code and fix* method of software development. Grand design placed emphasis on up-front requirements and design activities and on producing documentation during the early phases.

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Grand Design (Waterfall) Strategy, (Cont'd)

Description
Grand design provides a structured, disciplined method for software development. However, it did not support modern development practices, such as prototyping and automatic code generation. (*General Services Administration's, Alternatives to Grand Design for Systems Modernization, discusses when the waterfall is not appropriate and suggests alternative methods.)* With each activity as a prerequisite for succeeding activities, this strategy is a risky choice for unprecedented systems because it inhibits flexibility. With a single pass through the process, most integration problems surface too late. Also, a completed product is not available until the end of the process, which can discourage customer involvement.

Summation

Selecting an appropriate program strategy is not always an easy task. All program strategies presented here have unique advantages and limitations that must be considered in their selection. The SSC encourages consideration of using the prototyping strategy with the program life cycle you select based on the criteria listed in Rapid Prototyping Attachment 5.4.2-2 of this document.

Appendix M

Domain Analysis and Design/Project Summary Worksheets

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Project Summary Worksheet

Introduction On the pages that follow are photocopier-ready forms extracted from the DISA/JIEO/CIM Software Reuse Program Software Reuse Metrics Plan, version 4.1. Refer to the referenced document for further information.

PROJECT SUMMARY WORKSHEET

Program/Project Manager _____ Phone _____ Date _____

Organization _____ Email _____

Project Name _____

See DISA/JIEO/CIM Software Reuse Metrics Plan, version 4.0, for explanation of terms.

Part 1: Planned

New custom SLOC	_____	Reuse repository sources:
New reusable SLOC	_____	_____
Verbatim reuse SLOC	_____	_____
Adaptive reuse SLOC	_____	_____
Acquired for reuse fees ($)	_____	
Effort (staff-hours)	_____	
Number of problem reports	_____	
Start date	_____	
Completion date	_____	

Part 2: Actual

New custom SLOC	_____	Reuse repository sources:
New reusable SLOC	_____	_____
Verbatim reuse SLOC	_____	_____
Adaptive reuse SLOC	_____	_____
Acquired for reuse fees ($)	_____	
Effort (staff-hours)	_____	
Number of problem reports	_____	
Start date	_____	
Completion date	_____	

version 93/08/04

Domain Analysis and Design Worksheet

DOMAIN ANALYSIS AND DESIGN WORKSHEET

Domain Manager Name _____ Phone _____ Date _____

Organization _____ Email _____

Domain Name _____

Sub-domain Name _____

Part 1: Planned Date plans recorded _____

Methodology used for domain analysis and design _____

What is the last step in your planned domain engineering process? _____

Estimated start date _____ Estimated completion date _____

Estimated staff-hours (not counting training) _____

Estimated number of domain engineers (DEs) _____

Amount of previous domain experience held by DEs (staff-months) _____

Amount of previous domain analysis experience held by DEs (staff-months) _____

Systems to be analyzed: Number _____ Number fielded _____

Average size of systems in domain (SLOC) _____

Number of projects expected to use results of domain analysis _____

What products are planned to be produced? _____

_____

_____

Part 2: Actuals Date actuals recorded _____

Methodology used for domain analysis and design _____

What was the last step in your domain engineering process? _____

Actual start date _____ Actual completion date _____

Actual staff-hours (not counting training) _____

Actual number of domain engineers (DEs) _____

Actual number of domain experts interviewed _____

Actual number of hours spent interviewing domain experts _____

Amount of previous domain experience held by DEs (staff-months) _____

Amount of previous domain analysis experience held by DEs (staff-months) _____

Actual characteristics of each system analyzed:

Brief name	Had documentation?		Documentation up-to-date?		System fielded?		SLOC (DISA/JIEO/ CIM/XE Core definition)
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____
_____	o Yes	o No	o Yes	o No	o Yes	o No	_____

Number of projects expected to use the results of domain analysis _____

What products were produced?

Appendix N

SSC Software Engineering Process (SEP)
LAN Access Instructions

SSC SOFTWARE ENGINEERING PROCESS (SEP)
LAN Access Instructions

(*As Of: 20-Sep-96)*

1. There are two ways to access the SEP on the SSC LAN:

a. From DOS: (Before executing Windows).

(1) From the DOS prompt, type "**f:\public\attach B856-1fs1/SEP"** (Drive "f:" may be different for some systems).

(2) Next, type "**f:\public\map s: = B856-1fs1/SEP:**" (Note: "s:" can be any available drive).

(3) Now, execute Windows and enter Word for Windows to access the SEP from Drive s:, or the drive you selected. (See Paragraph 2 below ; ***NOTE: USE "NORMAL MODE." DO NOT USE "PAGE LAYOUT.")***

b. From Windows:

(1) From File Manager/Disk Menu, select "Network Connections."

(2) Do the following steps to connect to the B856-1fs1 file server:

(a) Click "Browse," "Attach," and then select "B856-1fs1" from the list.

(b) Type "SEP" for the USERNAME (no password) and then press OK.

NOTE: You *may* have to repeat (b) above when you reboot your system.

(c) From the Browse window, select "B856-1fs1/SEP" from the list and press OK.

(d) This will return you to the "Network Drive Connection" window.

(e) Select an unused drive from the list and click "Map." (Note: Do not mark the "Permanent" box since the LAN has a limit of 100 permanent attachments to the file server.) Now click "Close." You may now access the SEP the way you would access any other "Word for Windows" file, from the drive you mapped to.

2. The entire SEP is contained in file "@SEP.DOC." This is a special file that allows the use of the Word for Windows **(Version 2.0 only)** browsing engine. Other files are included for printing or use in other applications. ***NOTE: USE "NORMAL MODE." DO NOT USE "PAGE LAYOUT ." Page layout takes 4 times as long to load.*** Review the "Readme" file for further information.

3. The SSC SEP on the LAN will always contain the latest version. All changes will be posted to file "Changes.doc."

4. If you have any problems accessing the SEP on the LAN, call Dick Stowers, 6-3781, or Darrel Tubbs, 6-3782.