

ELECTRONIC RECORDS ARCHIVES

CONFIGURATION MANAGEMENT PLAN (CMP v2.3)

(WBS # 1.1.9.2.2)

for the

**NATIONAL ARCHIVES AND
RECORDS ADMINISTRATION**

**ELECTRONIC RECORDS ARCHIVES
PROGRAM MANAGEMENT OFFICE
(NARA ERA PMO)**

Draft

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CONFIGURATION MANAGEMENT PLAN (CMP)

1.0 Introduction

This document describes the Configuration Management (CM) activities to be performed in support of the Electronic Records Archive (ERA) Program. The ERA will be a large-scale, comprehensive, software-intensive system designed to provide electronic preservation across the National Archives and Records Administration (NARA) and to its user communities. ERA is considered to be a software-intensive system and therefore a tailored version of the Institute of Electrical and Electronics Engineers (IEEE) Standard 828-1998, Standard for Software Configuration Management Plans, will be used to guide the development of this plan. The tailoring of this standard as it applies to this document is specified in **Appendix A, IEEE Std. 828-1998 Document Tailoring**.

1.1 Purpose

The purpose of this document is to define the practices and procedures required to accomplish configuration management throughout the life cycle of the ERA program. The intended audience for this document is the ERA Program Management Office (PMO), ERA contractor development team(s), NARA management, and other government management who have oversight responsibilities for the ERA Program.

1.2 ERA Program Overview

ERA will be a comprehensive, systematic, and dynamic means for preserving virtually any kind of electronic record, free from dependence on any specific hardware or software. ERA, when operational, will make it easy for NARA customers to find records they want and easy for NARA to deliver those records in formats suited to customers' needs.

1.3 Scope

CM is a system engineering discipline that formalizes the management of the configuration of a system and controls changes to the system throughout its life cycle. The key principles of CM ensure that all components of the system can be uniquely identified and managed and that any previous version of the system can be readily reproduced. CM activities that will be discussed in this plan are; configuration identification (**Section 3.1**), configuration control (**Section 3.2**), configuration status accounting (**Section 3.3**), and configuration audits and reviews (**Section 3.4**). In addition, interface control (**Section 3.5**) and subcontractor/vendor control (**Section 3.6**) are CM activities that will be discussed separately due to their high risk nature. This section discusses the scope to which CM activities will be applied for the ERA program.

This Configuration Management Plan (CMP) applies to all software, hardware, and as applicable, firmware items, configuration documents, physical media, and physical parts that represent or comprise the ERA system. In addition, it applies to all software, hardware, and as applicable, firmware items, documentation, physical media, and physical parts used by ERA and

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ERA contractor development team(s) to support various development activities, including engineering, implementation, testing, and configuration management.

As additional contractor development details are defined, the CMP will be updated to specify the details and procedures for integrating system components developed and delivered from the ERA contractor development team(s) into the ERA system. Procedures will address the requirement to ensure that “separate but equal” CM is performed for the various ERA contractor development teams to ensure the protection of contractor sensitive information and assets while providing equal access to all public ERA Program information and support.

This CMP will be applied throughout the entire life cycle of the ERA Program, from concept exploration through system operation and support. (See the *ERA Life Cycle (ELC)* document for a complete description of the ERA life cycle and development phases.) A schedule of CM activities as they will be provided throughout the ERA life cycle is provided in **Section 4.1, General CM Schedule**.

A list of sample items to guide the selection of candidate configuration items for CM is included in **Appendix B, ERA Configuration Items List (Sample List)**. This list also identifies the level of configuration management control that will be applied to each item, along with the program baseline in which the item is designated for placement under CM control. Work products will generally be considered under development and maintained under informal configuration control until they are approved for CM by the appropriate decision authority as described in the paragraphs below. The select configuration items (CIs) for the ERA program will be identified and approved by the Configuration Control Board (CCB) as discussed in **Section 3.1**.

There are three (3) levels of CM control that a configuration item or work product may be placed under.

- **Strict Control** – This is the highest level of CM control. Work products placed under strict control are those items that are directly related to the system and will be baselined. Change for items placed under strict control requires Configuration Control Board (CCB) review and approval.
- **Managed Control** – This is an intermediate level of CM control. Work products placed under managed control are those items that are related to managing the system, but are not part of the baseline and require CM control. Changes for items placed under managed control require Contracting Officer Representative (COR) or document owner approval as appropriate.
- **Working Area** – Items placed in the working area are not under CM control. Items placed in the working area are items that are still under development.

A summary of the configuration control levels, their required reviews, and the approving change authority are provided in **Table 1-1, Configuration Management (CM) Control Levels**, below.

Level of Control	Examples of Work Products	Required Review	Approval Authority
High: Strict	Software Requirements Design Management Plans Standard Operating Procedures (SOPs)	QA Review QA Audit Peer Review	PD CCB Chairperson CCB
Medium: Managed	Reports Project Forms Project Templates Project Checklists Meeting Minutes Project specific documents Logs Schedules	QA Review, when appropriate QA Audit, when appropriate Peer Review, when appropriate Manager/Owner's Review	COR Document Owner
None: Working	Drafts Work products under development Non-controlled items	Appropriate testing when product readiness is achieved	N/A

Table 1-1: Configuration Management (CM) Control Levels

Changes requested for items that are placed under managed control will be approved by the COR or the document owner as specified during the selection of the configuration item. Items that are placed under working control do not have a formal approval authority. All change requests for items that are placed under strict control require approval by the CCB.

1.4 Assumptions

A list of assumptions as they may impact the cost, schedule, or ability to perform configuration management activities for the ERA Program is provided below.

- Necessary funding and resources required to support CM activities will be available when needed.
- The schedule of CM activities and their task dependencies will be achieved.
- ERA contractor development team(s) CM tools will be compatible with ERA PMO CM and CM records will be compatible with ERA PMO formats.
- Access to contractor facilities, resources, and work products will be provided as required to allow reliable monitoring of contractor activities and work products.
- ERA PMO CM tools will be properly installed and adequately configured by the end of the Concept Exploration phase of the ERA life cycle to implement ERA documented CM procedures.

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- Interface with other CM organizations, e.g. NARA CCB, Interface CCBs, and working groups, etc, will be available as needed to support ERA CM activities.
- Delivery of work products will be provided within a sufficient time frame to allow required CM activities to be performed.

1.5 Limitations

A list of limitations and constraints as they may impact the administration of CM activities for the ERA program are discussed below.

- Multiple independent ERA development contractor teams may be selected for the design of individual components of the ERA system. ERA configuration management must ensure that adequate protection of contractor information and assets is provided during implementation of all CM activities throughout the entire life cycle of the ERA system.
- ERA development contractor teams may be geographically distributed. The ERA CM must ensure that the CM support environment and infrastructure will support CM activities for geographically distributed development.
- ERA will be developed in several increments with multiple system releases to provide increasing functionality to users within reasonable timeframes and to allow shorter periods for the evaluation of contractor progress and product suitability. ERA configuration management must ensure that adequate CM activities are provided to support the incremental release of system components and functionality.

1.6 Definitions and Acronyms

The technical terms used in this plan are defined in IEEE Std 610.12-1990, *IEEE Standard Glossary of Software Engineering Terminology*. **Table 1-2, Acronyms List**, contains a list of acronyms used herein.

ACRONYM	DEFINITION
ABL	Allocated Baseline
AoA	Analysis of Alternatives
AS	Acquisition Strategy
CCB	Configuration Control Board
CCP	Contractor's Coordination Plan
CDR	Critical Design Review
CI	Configuration Item
CM	Configuration Management
CMG	Configuration Management Guidance
CML	Configuration Management Library
CMP	Configuration Management Plan
ConOps	Concept of Operations
COR	Contracting Officer Representative
COTP	Contractor's Oversight and Tracking Plan

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ACRONYM	DEFINITION
COTS	Commercial Off The Shelf
CP	Change Proposal
CPF	Change Proposal Form
CPL	Concept Baseline
CPP	Configuration Management PVCS Procedures
CR	Change Request
CRF	Change Request Form
CSA	Configuration Status Accounting
CSCI	Computer Software Configuration Item
CUG	Change Request Database Users Guide
ECP	Engineering Change Proposal
ELC	ERA Life Cycle Document
ERA	Electronic Records Archives
ERB	Engineering Review Board
FBL	Functional Baseline
FCA	Functional Configuration Audit
FOC	Full Operational Capability
FP	File Plan
HWCI	Hardware Configuration Item
ICD	Interface Concept Document
IDD	Interface Design Document
IEEE	Institute of Electrical and Electronics Engineers
IOC	Initial Operational Capability
IRD	Interface Requirements Document
IVVP	Independent Verification and Validation Plan
MP	Metrics Plan
NARA	National Archives and Records Administration
PBL	Product Baseline
PCA	Physical Configuration Audit
PD	Program Director
PM	Project Manager
PMO	Program Management Office
PMP	Program Management Plan
PSD	Program Support Division
PVCS	Polytron Version Control System
QA	Quality Assurance
QM	Quality Management
QMP	Quality Management Plan
QPP	Quality Management Processes and Procedures
RD	Requirements Document
RFP	Request for Proposal
RKM	Risk Management Plan

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ACRONYM	DEFINITION
RQM	Requirements Management Plan
SARAD	System Architecture and Requirements Allocation Description
SDR	System Design Review
SOP	Standard Operating Procedure
Std	Standard
STP	System Test Plan
SyRR	System Requirements Review
SyRS	System Requirements Specification
TBD	To Be Determined
TEMP	Test and Evaluation Master Plan
TEP	Technical Review Process
TRA	Training Needs Assessment
TSP	Testing Management Plan
UC	Use Case
UCD	Use Case Document
UCM	Unified Change Management
VDD	Version Description Document
VM	Version Manager
WBS	Work Breakdown Structure

Table 1-2: Acronyms List

1.7 References

The standards, guidelines, and documentation used to develop the CMP are described in the sections that follow.

1.7.1 ERA PMO Documents

The following ERA PMO documentation was used to support the development of this document.

- Acquisition Strategy (AS), Version 2.1
- Configuration Management Guidance (CMG), Version 1.0
- Concept of Operations (ConOps), Version 1.1
- Configuration Management Plan (CMP), Version 2.0
- ERA Life Cycle (ELC), Version 1.1
- Metrics Plan (MP), Version 1.2
- Program Management Plan (PMP), Version 1.2
- Quality Management Plan (QMP), Version 2.0
- Testing Management Plan (TSP), Version 2.1
- Technical Review Process (TEP), Version 1.0

1.7.2 Standards and Guidelines

The standards and guidelines used in preparation of this document are listed below.

- IEEE Std. 610.12-1990, IEEE Standard Glossary of Software Engineering Terminology
- IEEE Std. 828-1998, IEEE Standard for Software Configuration Management Plans
- IEEE/EIA Standard 12207.0-1996, Software life cycle processes, March 1998
- IEEE/EIA Guide 12207.1-1997, Software life cycle processes – Life cycle data, April 1998
- IEEE/EIA Guide 12207.2-1997, Software life cycle processes – Implementation considerations, April 1998
- OMB Circular A-130, Management of Federal Information Resources

2.0 Configuration Management (CM) Management

This section contains specific organizational information related to the management and organization of configuration management elements and CM activities for the ERA. The following CM management elements will be discussed in the paragraphs below.

- Organization,
- Roles and responsibilities,
- The organizational entities versus their responsibilities, and
- The applicable policies, standards, and procedures.

2.1 Configuration Management (CM) Organization

The ERA PMO CM Organization consists of representatives from across the ERA PMO and ERA development contractor teams in each of the following roles.

- Program Director (PD)
- Contracting Officer Representative (COR)
- Configuration Control Board (CCB), (Reference the *CCB Charter*)
- Configuration Management (CM) Team
- Engineering Review Board (ERB), (Reference the *ERB Charter*)
- ERA Development Contractor Teams
- Other CCB's
- Quality Management (QM) Team
- Testing Team

The ERA CM Group consists of the CM Specialist and the CM Team members, including the CM Librarian, CM Integrator, and Software Tools Specialist, and is a subset of the overall ERA PMO CM Organization. (See **Section 5.4** for a detailed description of individual CM Team members and their responsibilities). Additionally, the ERA CM Group will interface with other CM Groups, including the ERA CCB (see the CCB Charter), ERA ERB (see the ERB Charter),

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NARA CM groups, NARA CCBs, and other ERA Contractor Development Team CM groups and other CCBs as necessary.

The ERA PMO CM Organization is illustrated in **Figure 2.1, PMO CM Organization**. Within the ERA PMO CM Organization, the CM Specialist oversees the CM Team and all CM activities and issues. The CM Specialist reports CM activities and issues to the PMD Director. The PMD Director reports CM activities and issues to the PD. The PD has the overarching responsibility for all CM activities for the ERA Program and delegates this authority as appropriate for the respective CM activities and tasks.

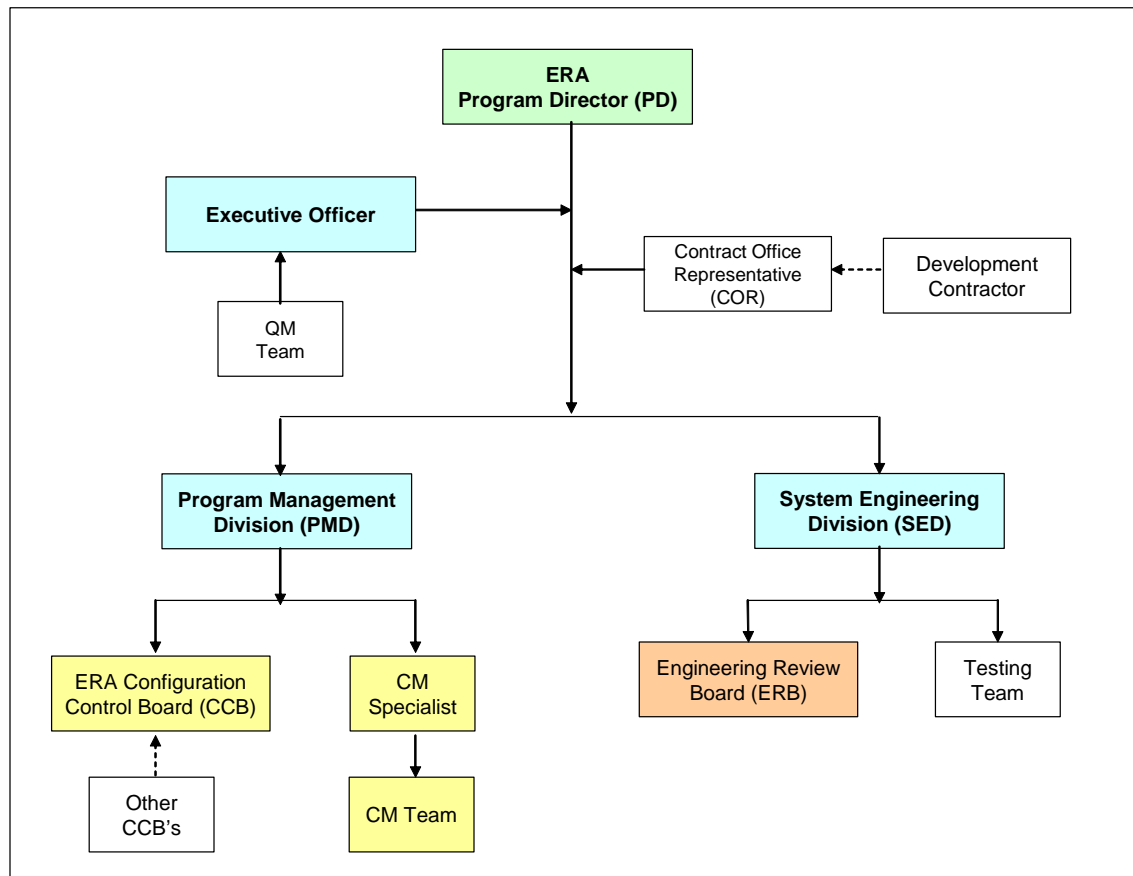


Figure 2-1: PMO CM Organization

It is expected that for a system of this size, there will be a need to support product interfaces, such as software-hardware and software-software interfaces. The organizational structure to support these interfaces will be addressed when additional details for interface requirements are specified. The Interface Requirements Document (IRD) is currently being drafted to identify critical interfaces. Additionally, as discussed in **Section 3.5**, Interface Control Working Groups will be established by ERA to manage and control changes to configuration items that interface

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with external systems. The roles and responsibilities for each Interface Control Working Group (ICWG) will be established for each interfacing system as details of these interfaces are defined.

2.2 Configuration Management (CM) Roles and Responsibilities

The primary CM responsibilities for each of the ERA PMO CM Organizational roles, as identified in **Section 2.1**, are discussed in this section and are provided in **Table 2-1, CM Organization Roles and Responsibilities**. These responsibilities are defined for the entirety of the ERA life cycle.

Roles	Required Responsibilities
Program Director (PD)	<ul style="list-style-type: none"> • Provides oversight of CM activities to ensure successful program performance and compliance with program policies and federal regulations. • Ensures adequate resources are available for CM activities. • Ensures that support team leads and other persons in management or supervisory roles support the objectives of this CMP. • Designates the CCB, CCB chairperson and others to make configuration management decisions on behalf of the PD. • Resolves open CCB issues by making the final decision. • Reviews CM metrics and other reports.
Executive Officer	<ul style="list-style-type: none"> • Supports the PD to provide overall program management and direction for ERA implementation. • Assists the PD to ensure that adequate CM staff supervision and hiring is provided. • Delegated by the PD to provide leadership and oversight of QM activities, processes, and tasks performed by the QM Team.
Program Management Division (PMD) Director	<ul style="list-style-type: none"> • Assists the ERA PD by providing leadership and program support for a wide range of analytical, management, and coordination duties. • Delegated by the PD to provide leadership and oversight of CM activities, processes, and tasks performed by the division staff and provides similar oversight of contractors. • Works closely with the Systems Engineering Division to ensure the successful implementation of CM activities for the ERA.

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Roles	Required Responsibilities
System Engineering Division (SED) Director	<ul style="list-style-type: none"> • Assists the ERA PD by providing oversight and leadership for all technical aspects of the ERA program throughout its software development lifecycle. • Permanent member of the ERB and provides key leadership to the board for the effective review and evaluation of engineering change proposals (ECPs). • Works closely with the Systems Engineering Division to ensure the successful implementation of CM and configuration control activities for the ERA.
Contract Officer Representative (COR)	<ul style="list-style-type: none"> • Reviews and approves program work products. • Oversees contractors' schedules, budget, and deliverables to ensure they meet contract requirements. • Reviews and evaluates project metrics to identify deficiencies and to make corrections where necessary • Identifies opportunities for improvement and develops strategies for improving processes. • Represents interest of ERA PMO, stakeholders, and potential users.
Configuration Control Board (CCB) (See the CCB Charter for additional information)	<ul style="list-style-type: none"> • Ensures that proposed changes are evaluated with respect to their impact on other program elements, including program cost, performance, schedule, and functionality. • Reviews change requests and change proposals to decide disposition. • Monitors and tracks the status of change requests and change proposals. • Ensures that only approved changes are implemented. • May be designated by the PD to approve baselines and configuration items for each baseline and changes to baselines. • Determines priority for change requests and change proposals, e.g. emergency, urgent, or routine priorities. • Identifies and approves configuration items for each baseline. • Coordinates activities with other related CCBs as needed.
Configuration Management (CM) Specialist	<ul style="list-style-type: none"> • Designated by the PD to execute and direct CM activities for the ERA program. • Works with the ERA PD and the PMD Director to ensure that adequate resources and funding are available to perform CM activities. • Develops the CMP during the initial system development phase and revises the plan as necessary throughout the lifecycle. • Oversees CMP implementation and development of detailed CM

Roles	Required Responsibilities
	<p>policy and procedures.</p> <ul style="list-style-type: none"> • Establishes the CM environment. • Ensures CM Team and program personnel receive adequate training to perform their CM activities. • Provides support to the CCB and the ERB. • Conducts CM audits according to documented procedures and tracks audit action items to closure. • Prepares and submits standard reports to document the status of CM activities to the ERA PD, PM and affected personnel. • Reviews CM status accounting and metric reports. • Reviews and monitors the development contractor’s CM activities. • Identifies CM project risks, provides related data to the ERA Risk Officer, and implements appropriate risk management measures. • Identifies opportunities for CM process improvement and develops strategies and implementation plans.
<p>Configuration Management (CM) Team</p>	<ul style="list-style-type: none"> • Establishes the ERA Configuration Management Library (CML). • Assists with the administration and management of CM tools and the management of the CM environment. • Maintains and documents system configuration items and baselines and records and reports configuration history for CM items. • Ensures that change requests and problem reports are initiated, recorded, reviewed, approved, and tracked according to the CMP and other relevant documented procedures. • Provides support to the CCB and ERB. • Assists in conducting CM audits. • Collects CM metrics and prepares CM metrics reports. • Collects configuration status accounting data and prepares reports. • Supports the coordination of CM activities with the development contractor’s CM team.

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Roles	Required Responsibilities
Development Contractor	<ul style="list-style-type: none"> • Responsible for all CM activities internal to the actual system integration. • Responsible for delivering the products necessary to create the ERA baselines and releases. • Ensures internal CM tools are compatible with those of the ERA CM tools. • Responsible for creation and implementation of an internal CMP that is compliant with contractual standards. • Ensures that subcontractor development and CM activities are compliant with internal and contractual CM standards.
Engineering Review Board (ERB) (See the ERB Charter for additional information)	<ul style="list-style-type: none"> • Assists in the technical evaluation review of change proposals. • Conducts impact analysis of change proposals. • Evaluates the cost, performance, and schedule impact of change proposals, and provides a recommendation to the CCB.
Other CCB's	<ul style="list-style-type: none"> • As system design and development proceeds, it may be necessary for ERA to establish multiple CCB's to manage CM for different CI types (e.g. hardware, software, COTS, etc.) and/or to handle varying levels of CM control. • Additionally, other CCB's may include interface CCB's to manage CIs that support critical interfaces external or internal to ERA.
Quality Management (QM) Team	<ul style="list-style-type: none"> • Audits CM program for compliance with documented procedures and standards and reports results to the ERA PD and affected personnel. • Ensures CM audits are conducted on all baselines. • Participates in the Functional Configuration Audit (FCA) and Physical Configuration Audit (PCA). • Performs various system reviews as required, to include, but not limited to the System Requirements Review (SyRR), System Design Review (SDR), and the Critical Design Review (CDR). • Verifies approved changes are implemented in accordance with documented plans, standards, and procedures.

Roles	Required Responsibilities
Testing Team	<ul style="list-style-type: none"> Responsible for using the appropriate testing and CM tools when performing all test activities. Assists in the development and identification of relevant configuration items, such as test plans, scripts, data, releases for testing, and test environments. Submits Change Requests (CRs) against releases of the system and modifications to configuration items that are the results of enhancements and/or defects identified during testing. Verifies changes implemented to configuration items.

Table 2-1: CM Organization Roles and Responsibilities

2.3 Organizational Entities versus Responsibilities

Specific CM activities and their level of responsibilities are shown in **Table 2-2, Roles vs. Responsibilities**, for each of the ERA PMO CM Organizational roles as identified in **Section 2.1**. Details of CM activities are defined in **Section 3.0**.

Responsibilities	PD	COR	QM	CCB	CM	Contractor	ERB	Users/ Testers
Baseline Definition				R,A	O,R			
Change Evaluation			R	A			O	
Change Request	O	O	O	R,A	O,R	O	O	O
Configuration ID	A		R		O			
Development CM			R		R	O, R, A		
Formal Audits/Reviews		R, A	O, R, A		O, R, A	O		
Problem Reporting	A, O	A, O	O, R	R	O, R	O	O	O
Status Accounting	A, R	R	R		O			

Table 2-2: Roles vs. Responsibilities Matrix

Key: O = Originate, R = Review, A = Approve

2.4 Applicable Policies, Standards, and Procedures

Listed below are policies, standards, and procedures that have an impact on the execution of this plan.

2.4.1 ERA Policies

The following policies direct the development of the CMP.

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- NARA Information Technology System Development Life Cycle Handbook, version 1.2, January 25, 2002
- NARA Information Technology System Development Guidelines, version 1.1, January 25, 2002
- *ERA Configuration Management Guidance (CMG)*

2.4.2 ERA Standards

The following standards have an impact on the development of this plan as defined below.

- Configuration Identification Standards and Naming Conventions – NARA Information Technology System Development Life Cycle Handbook
- Metric Standards – Reference the *ERA Metrics Plan (MP)*

2.4.3 ERA PMO Procedures

The following ERA PMO procedures have an impact on the execution of this plan.

- Procedures for retrieving Configuration Items (CIs) – Reference the *ERA Configuration Management PVCS Procedures (CPP)*
- Defect Reporting procedures – Reference the Problem Reporting and Corrective Action section of the *ERA QMP*
- Records Management procedures – Reference the *ERA File Plan*

Additionally, the ERA PMO is currently in the process of identifying and developing procedures to govern the daily execution and management of the ERA PMO. As ERA PMO procedures are developed, they will be reviewed to determine their impact on the execution of this plan. In addition, see **Section 5.1** for a list of proposed Standard Operating Procedures (SOPs), checklists, forms, and templates to aid the performance of various CM activities.

3.0 Configuration Management (CM) Activities

CM activities include all functions and tasks required in managing the CIs of the system as specified in the scope of this plan. Both technical and managerial CM activities shall be identified and controlled through implementation of the following CM processes.

- Configuration Identification
- Configuration Control
- Configuration Status Accounting
- Configuration Audits and Reviews
- Interface Control
- Subcontractor/Vendor Control

3.1 Configuration Identification

Configuration identification forms the cornerstone upon which all CM activities are based. Configuration identification is an element of CM that is concerned with selecting the CIs for a system or product, assigning unique identifiers and naming conventions, and recording their functional and physical characteristics in technical documentation. A CI is defined as an aggregation of hardware, software, or both, that is designated for CM and treated as a single entity in the CM process (IEEE Std 610.12-1990). This section specifies the configuration identification activities to be performed during the ERA life cycle, including, identifying CIs, naming CIs, and acquiring CIs.

3.1.1 Identifying Configuration Items

Configuration identification activities identified for the ERA program include the selection of configuration items, baseline management, and the unique identification of configuration items (e.g. the numbering or naming CIs). The following paragraphs will specify configuration identification activities for the ERA program and will include the following:

- ERA Baselines,
- System CIs, and
- Configuration Identification Documents.

3.1.1.1 Identifying ERA Baselines

A baseline is a logical grouping of configuration items that constitute the system. Baselines provide a fixed reference to specify the configuration items at a particular milestone event or point in time. A baseline establishes an approved standard upon which subsequent work can be made. After an initial baseline is established, changes to the baseline can only be performed through a formal change request process as identified in **Section 3.2**.

The ERA CM establishes five (5) types of baselines.

- Concept baseline (CBL)
- Functional baseline (FBL)
- Allocated baseline (ABL)
- Production baseline
- Product baseline (PBL)

All baselines shall be reviewed, established and approved by the ERA CCB. See the CCB Charter for additional information about CCB authority and procedures. Changes to baselines are submitted as change requests (see **Section 3.2, Change Control**) and approved by the ERA CCB.

The five (5) baselines identified for ERA and a list of the proposed contents for each are described below:

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- **Concept Baseline (CBL)** The CBL documents the activities performed during concept exploration and controls the related program management plans and procedures developed during the initiation of the program. A CBL will be established at the end of the concept exploration phase at contract award. A list of proposed CIs to be included in the CBL is provided below. Approval of an official list of CIs for the CBL will be performed by the CCB at contract award.
 - *ERA ConOps*
 - *ERA RD*
 - *ERA Analysis of Alternatives (AoA)*
 - *ERA Acquisition Strategy (AS)*
 - *ERA Business Case Analysis (BCA)*
 - *ERA Request for Proposal (RFP)*
 - *ERA Use Case Document (UCD)*
 - ERA Use Cases (UC)

- **Functional Baseline (FBL)** An FBL contains the approved technical documentation for a CI that establishes the functional and performance characteristics, interoperability requirements, and verification requirements for the system's CIs. An FBL will be established near the start of the concept development phase following the performance of a System Requirements Review (SyRR) and delivery of required documentation to the CM Specialist. A list of the proposed items to be included in the FBL is provided below. Approval of an official list of CIs for the FBL will be performed by the CCB at the start of concept design and will be reviewed at each increment of the ERA system.
 - *ConOps*
 - System Requirements Specification (SyRS)
 - Interface Concept Document (ICD)
 - Interface Requirements Document (IRD)
 - Test and Evaluation Master Plan (TEMP)
 - Any other defined work products existing at the end of the requirements definition activity

- **Allocated Baseline (ABL)** An ABL contains the approved specification for governing the development and verification of the system CIs. An ABL will be established during the initial concept development phase following the performance of a SDR. The CM Specialist verifies that all required documents and CIs are established properly. A list of the proposed CIs to be included in the ABL is provided below. Approval of an official list of CIs for the ABL will be performed by the CCB during concept development and will be reviewed for each increment of the ERA system.
 - System Architecture and Requirements Allocation Description (SARAD)
 - Interface Design Document (IDD)
 - Contractor System Test Plan

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- All other work products developed through design, including changes to previously delivered products
- **Production Baseline (PBL)** A production baseline contains the approved documentation for defining a CI during the production, operation, and maintenance phase of the system's life cycle. A production baseline is established for each scheduled release of ERA throughout the concept development and initial production phase. ERA *Acquisition Strategy* identifies an incremental approach to manage acquisition risk and to release components into the system faster. ERA will be implemented in as many as five (5) separate increments. Each increment will have multiple system releases, containing two (2) or three (3) releases. Multiple system releases provide users with increasing functionality within reasonable timeframes and allows the PMO to evaluate contractor progress and product suitability. See the *ERA AS*, **Section 3.2 Incremental Acquisition Approach** for additional information regarding multiple releases of ERA. The impact of this strategy will require multiple production and product baselines to be established. Production baselines will be established for each release, while product baselines will be established for every increment.

A list of proposed CIs to be included in the production baseline for each release is provided below. Approval of an official list of CIs for the production baseline will be performed by the CCB near the completion of each release.

- Contractor Software Code
- Contractor Test Cases and Procedures
- Contractor Test Report
- Acceptance Test Plan
- Acceptance Test Report
- Version Description Document (VDD) (release)
- **Product Baseline (PBL)** A PBL is similar to the production baseline. It contains the approved documentation for defining a configuration item during the production, operation, and maintenance phase of the system's life cycle. However, a PBL is established when total increment functionality has been accomplished at the completion of each increment. The PBL encompasses all releases for the present increment and each prior increment. The final increment will provide ERA with Full Operational Capability (FOC). A PBL will be established for each increment following verification of the maturity of the configuration items and performance of a Critical Design Review (CDR). The CM specialist will verify that the tested product is complete and accurately described in the PBL documents.

A list of proposed CIs to be included in each new increment PBL is provided below. Approval of an official list of CIs for the PBL will be performed by the CCB at the completion of each increment for the ERA system.

- Contractor Software Code

- Contractor Test Cases and Procedures
- Contractor Test Results
- PMO Acceptance Test Plan
- PMO Acceptance Test Report
- Contractor Training documentation
- Contractor User documentation
- Contractor Operation/Maintenance documentation
- Contractor CM data (archive file)
- VDD (increment)
- All contract deliverables

Figure 3-1, ERA Program Baselines and Milestones, illustrates these baselines as they occur throughout the ERA life cycle.

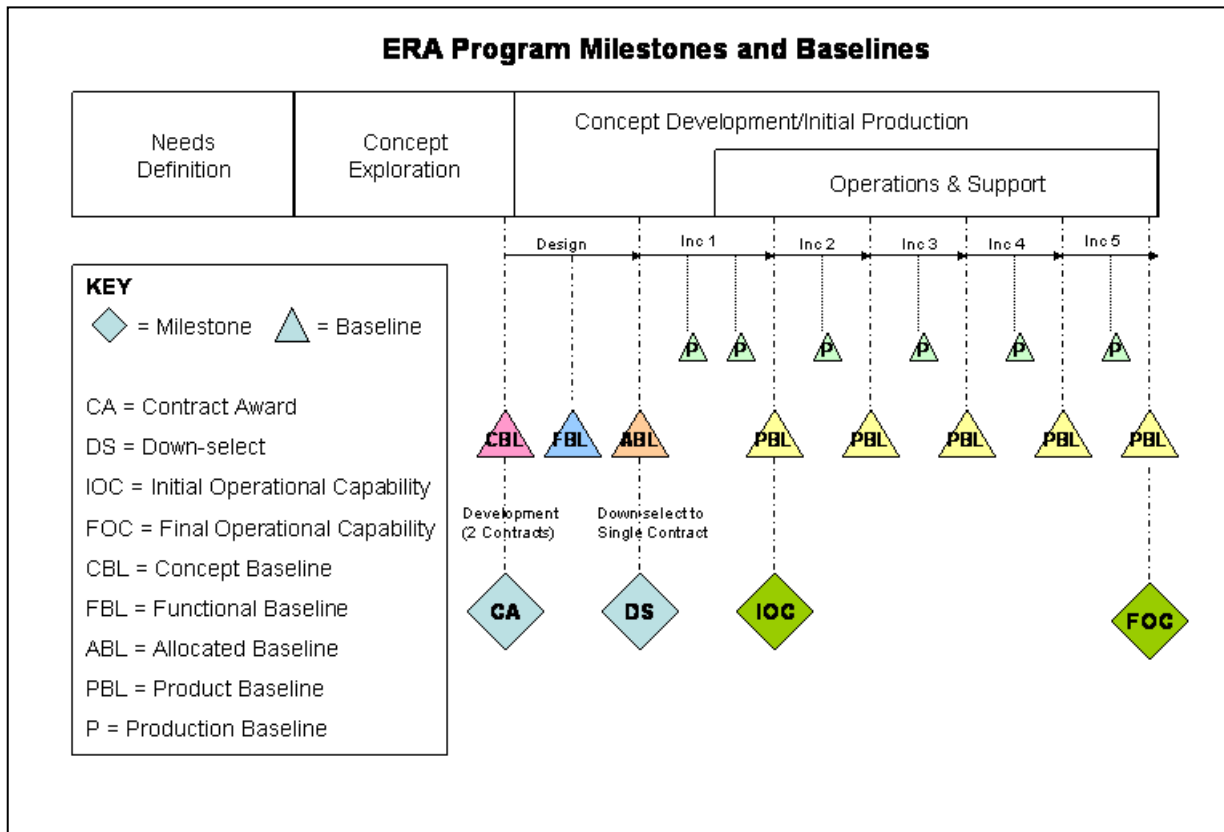


Figure 3-1: ERA Program Milestones and Baselines

3.1.1.2 ERA Baseline Promotion Levels

Typically, as development on the project progresses, the quality and stability of the CIs within a baseline improves. Baseline promotion levels will be used to label the quality of the baseline as

determined from the successful completion of an activity, such as development, testing, or release. ERA has identified five baseline promotion levels. These levels are defined in **Table 3-1, Baseline Promotion Levels**, below.

Promotion Levels	Description
Initial	Designates the beginning state for the baseline. Also used to designate an unknown state.
Built	Baseline has been successfully compiled and linked.
Tested	The system has successfully passed system testing, including functional, load, performance, and stress tests, testing results have been verified by the ERA PMO Test Team.
Released	The system has successfully passed all levels of system and acceptance testing and has been approved for release by the ERA PMO CCB.
Rejected	Baseline has not been approved for use.

Table 3-1: Baseline Promotion Levels

3.1.1.3 Identifying System Configuration Items

System architecture identifies the structure and relationships of system activities, components, and elements within the ERA system. The development of system architecture for ERA that will comprise all components of ERA will be a considerable activity. The actual system architecture and design will not be decided until the early part of the concept development phase. A proposed structure to support the logical identification of system components and their relationships is provided in **Figure 3-2, ERA System Architecture**, and described in the following paragraphs. This structure will be further refined as details of the system design progress.

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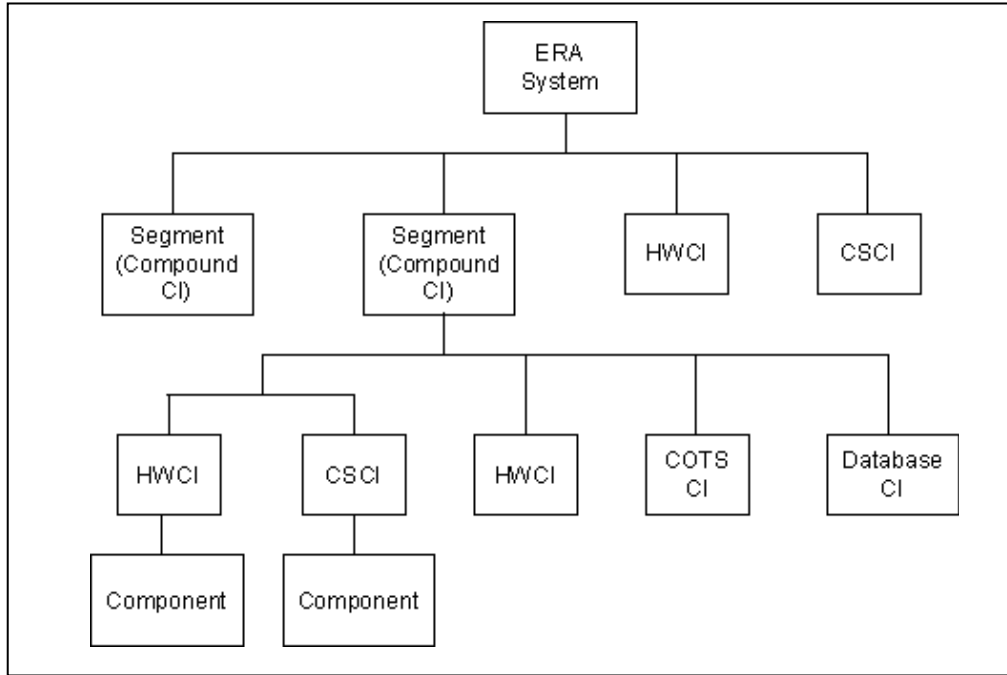


Figure 3-2: ERA System Architecture

ERA System – The ERA system is the highest level of composition and represents the collection of segments, Hardware Configuration Items (HWCIs), Computer Software Configuration Items (CSCIs), Commercial-Off-The-Shelf (COTS) CIs, database CIs, and components that are required to accomplish the complete functionality of the ERA system.

Segment – A segment is a high level activity of the ERA system that is composed of configuration items (e.g. hardware, software, COTS, and database configuration items) and lower level components. The ERA system is decomposed into nine (9) functional segments which represent major capabilities of ERA and two (2) major activities; testing and support. ERA segment categories are illustrated in **Figure 3-3, ERA Segment Categorization**. See the *Requirements Document (RD) Section 2.7, Requirements Categorization*, for a detailed description of the major capabilities for each segment.

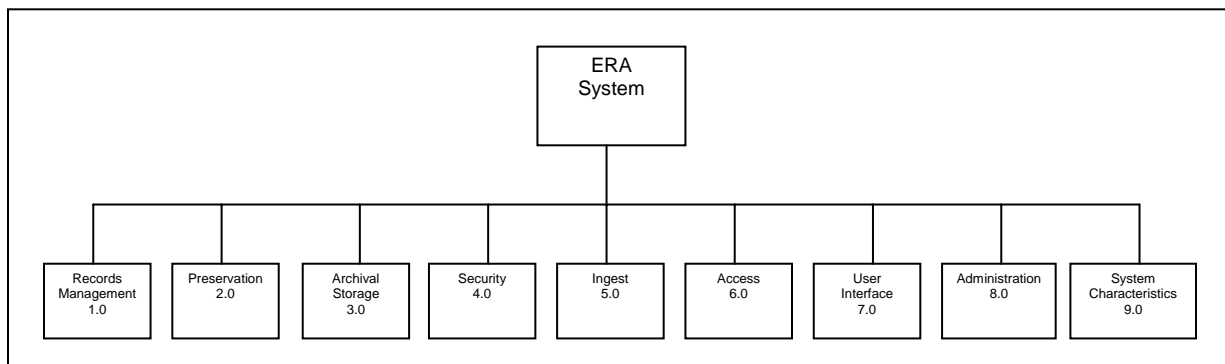


Figure 3-3: ERA Segment Categorization

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System Configuration Items (CIs) – CIs are an aggregation of reasonably mature hardware, software, COTS, or database components that combine together to perform a specific function or functions. A CI may be related to a specific segment or may be a primary sub-level to the general ERA system. There are four (4) types of CIs that have been identified for the ERA system and they are discussed below.

Hardware Configuration Item (HWCI) – An HWCI is an aggregation of hardware components that is designated for CM and is treated as a single entity.

Computer Software Configuration Item (CSCI) – A CSCI is an aggregation of software components that is designated for CM and treated as a single entity.

Commercial Off The Shelf (COTS) CI – A COTS product CI is pre-packaged computer software that performs a specific function or functions. Examples of COTS CIs include operating system software, networking software, database software, etc. Selected COTS CIs that are designated for CM are treated as a single item.

Database Configuration Item – A database CI is a collection of interrelated data that is organized and stored within electronic files. Selected database CIs that are designated for CM are treated as a single item.

Component – A component is a distinct part of a CI that is designated for separate CM. A component may be composed of other components.

3.1.1.4 Identifying Configuration Identification Documents

Configuration identification documents are technical documents that support the configuration and development of a configuration item throughout the life cycle of the system. These technical documents are developed through increasing levels of detail as the system evolves. Technical documents are used to establish baselines at specific milestones throughout the life cycle of the system (see **Section 3.1.2.3** for discussion on ERA baselines).

Three types of technical documents identified for the ERA program are listed below and discussed in the following paragraphs.

- Specifications
- Drawings and parts lists
- Manuals, management plans, and procedures

Specifications

Specifications state the functions and capabilities that a system must provide and the constraints that are applied to the system. Specifications can be documented in several ways including; textual descriptions, graphical models or drawings, and mathematical models. Approved specifications for the ERA program will be placed under CM control.

Drawings and Parts Lists

An engineering drawing is a pictorial representation that depicts the functional and physical characteristics of a configuration item. A parts list is a list of all parts required for the development of a configuration item. Approved engineering drawings and parts lists for the ERA program will be placed under CM control.

Technical Manuals

Technical manuals describe the operation, installation, administration, and maintenance of the system. Technical manuals are generally contract deliverables and will be controlled and maintained under CM control to ensure that they are compatible with the CIs that they describe. Examples of technical manuals include:

- System Operator's Manuals
- User Manuals
- System Maintenance Manuals

Management Plans

Management plans and procedures describe the various activities required for the management of the ERA program. These documents define the organization, policies, procedures, standards, schedules, and resources that are required to provide for the execution of these activities. These documents include PMO generated and contractor deliverables and will be placed under CM control once they are accepted by the ERA PMO. Examples of management plans include:

- Program Management Plan
- Software Development Plan
- Configuration Management Plan
- Quality Assurance Plan
- Acceptance Test Plan

3.1.2 Naming Configuration Items (CIs)

A naming convention, combined with a numbering scheme is used to uniquely identify the CIs, baselines, and technical documents that are placed under CM control for the ERA program. These naming conventions uniquely identify each item and their different versions. When a CI number is assigned to an item, it can never be changed or used to identify another item or different version of that item. The following paragraphs describe the naming conventions for baselines, configuration items, and configuration identification documents for the ERA program.

3.1.2.1 Naming ERA Baselines

This section describes the methods for naming baselines for the purpose of storage, retrieval, tracking, reproduction, and distribution. The naming convention as provided in **Table 3-2, Baseline Naming Conventions**, will be used to name ERA baselines.

Naming Convention	Applicable Baselines
ERA.BLx.Iaa.Rbb.Vcc.dd	Concept Functional Allocated Production Product

Table 3-2: Baseline Naming Conventions

Table 3-3, Baseline Identification, provides the descriptors for the project, CI type, and phase to be used when applying the baseline naming conventions as defined in **Table 3-2** above.

Project	CI Type	Life cycle Phase	Baseline
ERA	BL	1	Concept
ERA	BL	2	Functional
ERA	BL	3	Allocated
ERA	BL	4	Production
ERA	BL	5	Product

Table 3-3: Baseline Identification

- **System** is the name of the high-level activity such as ERA, AAD, PERPOS, or EGOV. Project names in baselines must be approved by the CM Specialist.

- **BL** identifies the baseline

X is the baseline life cycle phase where

- 1 identifies Concept Baseline
- 2 identifies Functional Baseline
- 3 identifies Allocated Baseline
- 4 identifies Product Baseline
- 5 identifies Production Baseline

- **I** identifies the increment. Only the Product and Production baselines will include the increment identifiers in its naming conventions.

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aa indicates the number of major changes to that increment of the baseline within the indicated life cycle phase and builds stage. It is increased by one (1) when a new increment is defined.

- **R** identifies the release

bb indicates the number of major changes to that release of the baseline within the indicated life cycle phase and builds stage. It is increased by one with each successive build, and is reset to 01 when a new release is defined.

- **V** indicates the version

cc indicates the number of minor changes to that release of the baseline within the indicated life cycle phase and stage. It is increased by one with each successive change, and is reset to 01 when a new release is defined.

- **dd** indicates the number of minor changes to the specific version within the indicated life cycle phase and stage. It is increased by one with each successive change, and is reset to 01 when a new version is defined.

Naming convention examples for baselines:

BL1.I01.R01.V01.02 indicates a functional baseline, increment 01, release 01, version 01, and minor change number 02 within the version 01.

BL4.I01.R02.V02.01 indicates a production baseline, increment 01, release 02, version 02, and minor change number 01 within the version 01.

3.1.2.2 Naming System Configuration Items

This section describes the methods for naming system CIs for the purpose of storage, retrieval, tracking, reproduction, and distribution. System CIs shall use the following format.

ERA.Segment.CI Type.CI Subtype.CI Name.CI Version.Component Name.Component Version

Table 3-4, ERA CI Naming Convention Data Type Standards, provides a summary of the ERA naming convention data type standards and requirements.

Element	Data Type	Required
System	ERA/3 alpha characters	Yes
Segment	3 alpha characters	No
CI Type	2 alpha characters	Yes
CI Subtype	3 alpha characters	No

CI Name	1-15 alphanumeric characters	Yes
CI Version	Numeric	No
Component Name	1-15 alphanumeric	No
Component Version	3-5 alpha characters	No

Table 3-4: ERA Systems CI Naming Convention Data Type Standards

A detailed description of the naming conventions for the ERA System components and CIs is provided in the paragraphs below.

Segments – Segments are a mid-level activity directly under the ERA System project level and use a three (3) character field as shown in **Table 3-5, ERA Segment CI Naming Convention Descriptions**.

Segment ID	Segment CI Name	Description
1.0	RMS	Records Management
2.0	PRS	Preservation
3.0	ARC	Archival Storage
4.0	SEC	Security
5.0	ING	Ingest
6.0	ACC	Access
7.0	USI	User Interface
8.0	ADM	Administration
9.0	SYS	System Characteristics
10.0	TST	Test
11.0	SPT	Support

Table 3-5: ERA Segment CI Naming Convention Descriptions

Configuration Items (CIs) – CIs are a mid-level component of the ERA system that may be associated with a system segment or directly linked to the general ERA system. The naming convention for the CIs is organized into four (4) parts; CI type, CI subtype, CI name, and CI version. The naming conventions for CIs are described below.

- **CI type** – is the mid-level name of the system CI with a two (2) character field as listed below:

HW – Hardware

SW – Software

CO –COTS

DB – Database

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- **CI subtype** – is an optional sub-level name under the CI type, having a three (3) character field (See **Appendix D, Configuration Item (CI) Types and Subtypes**, for a list of the CI types and subtypes).
- **CI name** – CI name is a mandatory descriptive name for the CI and is limited to 15 alphanumeric characters
- **CI version** – CI version is an optional numeric that identifies the version number of the configuration item.
- **Component name** – Component name is a descriptive name for a CI if it is specified to the component level. Component name is required only if a component is specified and is limited to 15 alphanumeric characters.
- **Component version** – Component version is an optional numeric that identifies the version number of the CI.

3.1.2.3 Naming Configuration Identification Documents

This section describes the methods for naming configuration identification documents for the purpose of storage, retrieval, tracking, reproduction, and distribution. Configuration identification document shall use the following format.

ERA.CI Type.CI Subtype.Version Number.Release Number.Draft Number

Table 3-6, ERA Configuration Identification Document Naming Convention Standards, provides a summary of the ERA naming convention data type standards and requirements.

Element	Data Type	Required
System	ERA/3 alpha characters	Yes
CI Type	DC/2 alpha characters	Yes
CI Subtype	3-4 alpha characters	Yes
Version Number (Major Document version)	Numeric	Yes
Release Number (Minor Document revision)	Numeric (If the document is a new version, the release number will be zero (0).)	Yes
Draft Number (Working Draft Number)	Numeric (When a draft is accepted the Release Number and/or Version Number as appropriate is incremented by one (1) and the draft number is dropped off.)	No

Table 3-6: ERA Configuration Identification Document Naming Convention Standards

3.1.3 Acquiring Configuration Items (CIs)

The CM Librarian maintains the CM Library (CML), which is the authoritative repository for the storage of approved CIs. The CML maintains all software and document CIs and their metadata, which is the data that describes the CIs within the repository. The CML also maintains the metadata for physical media stored within the physical library, including the storage location of the item. The CML provides access control to authorized users. Applying changes to items stored within the CML must follow the change control process as discussed in **Section 3.2**, and adhere to formal procedures for creating and updating items in the CML.

The CML is divided into six (6) separate areas; an area for items that are placed under strict control, managed control, static library, staging area, a physical library, and the archive. These areas are discussed in the following paragraphs.

- **Strict Control Area** – The strict control area is a subset of the CML that maintains approved CIs for the baselines. The ERA will use an automated CM tool to store and maintain items placed under strict control. Currently, ERA uses the Polytron Version Control System (PVCS) tool to maintain controlled items.
- **Managed Control Area** – The managed control area is a subset of the CML that maintains CIs that are placed under managed control. A combination of automated CM tool and/or shared drive will be used to store and maintain items placed under managed control.
- **Static Library** – The static library is also a subset of the CML. The static library is the area where items are placed to be used, such as for testing, integration, or review. Items that are placed in the static library cannot be changed. The specific location of the static library may depend upon the context of its use, and may reside within an automated tool, such as PVCS or Rational, or on a shared drive as “read-only”.
- **Staging Area** – The staging area is the area where items are delivered for hand-off. Items that are delivered from the contractors are stored in the staging area and will be verified and prepared for use. Rejected items are returned to the contractor from the staging area. A combination of automated tool and shared drive may be used to maintain items in the staging area.
- **Physical Library** – The physical library is also a subset of the CML, and stores and maintains physical work products, such as hardware components, software components, or signed copies of an accepted document. A protected and secured area will be designated by the CM specialist to store and maintain items placed in the physical library. An automated CM tool will be used to maintain the descriptive metadata about these items and the location information for where each physical item is stored.
- **Archive** – The archive area is managed by PVCS. The archive will maintain items that are placed in controlled areas that have superseded versions or are obsolete. The archive

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will also maintain all controlled items for the project upon project completion. The CM specialist will have control over the storage and restoration of work products placed in the archive area. Work products that are stored on the shared drive will require an archive area to be defined if one is needed.

The Working Library and the ERA PMO Archive serve as important repositories for work products developed for the ERA program, but are not part of the CML. These libraries are managed separately by the contractor, CM, or responsible party or organization to ensure that the integrity of the work product is preserved.

- **Working Library** – The working library is where work products are stored while they are being developed. The working library is not part of the CML, but is provided to ensure the proper development and integration of work products until they are approved CIs. The working library will be established and maintained by the development contractors. Periodic review of the working libraries and its content will be performed by ERA to ensure the proper adherence of procedures and maintenance to the contractor’s Configuration Management Plan.
- **ERA PMO Archive** – The ERA PMO Archive maintains the hardcopy originals for all program deliverables and approved work products. The ERA PMO Archive is maintained separately from the CML by the ERA Program Records Manager, and items will be retained according to NARA’s records retention schedule for the ERA PMO. (See **Section 4.2, Records Retention Schedule**)

The CML is composed of several areas as illustrated in **Figure 3-4, ERA Configuration Management Libraries**.

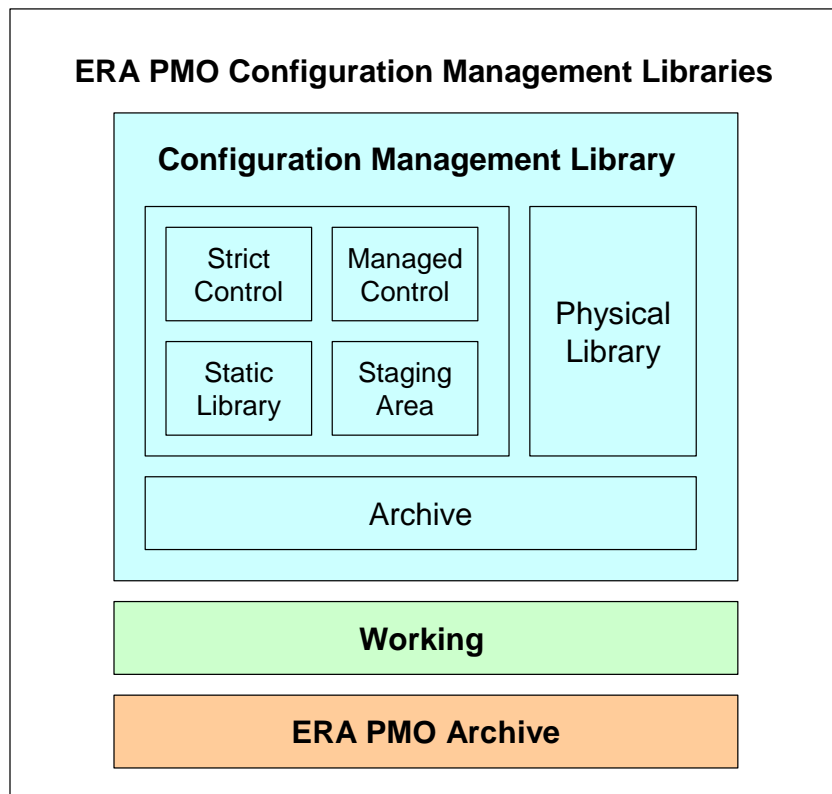


Figure 3-4: ERA Configuration Management Libraries

Currently, ERA is using Merant's PVCS Version Manager (VM) to maintain the CML. The *ERA Configuration Management PVCS Procedures (CPP)* document describes the procedures for reproducing, storing, accessing, and retrieving CIs. ERA is exploring the use of IBM's Rational ClearCase as the automated CM tool for future storage and maintenance of controlled items. The Rational tool suite will provide for improved integration of CM tools and consolidate several stove-piped databases to provide better reporting capability. The Rational tools that ERA is considering for implementation include ClearCase, to provide the CM repository for the CML and storage of CM controlled items; ClearCase for change control management, RequisitePro for requirements management, and TestManager for managing system testing and tracing test cases. A discussion of the Rational tools that will be used to support specific CM activities within the ERA environment is provided in **Section 5.2**.

3.2 Configuration Control

Configuration control is a formal process for which a change to the specification of a configuration item is systematically proposed, evaluated, approved or disapproved, and implemented. Configuration control is an important process for regulating the configuration of

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system baselines and configuration items and ensuring that only approved changes are implemented. Configuration control ensures that system baselines are accurate and known throughout the life cycle of the system. Currently, configuration control activities are processed and managed through the ERA Change Request Tracking System (see **Section 5.2.2**), and the output of configuration control activities are collected and reported in configuration status accounting and metrics reports (see **Section 3.3**). The change control process as identified for the ERA program is discussed in the following sections.

3.2.1 Requesting Changes

Requesting a change is the activity that initiates the change request process for the ERA program. Changes to baselined configuration items are initiated through an ERA Change Request form (CRF) which is used to document relevant information, such as configuration item information, priority of change request, name of requestor, description of change, and need for change. The CM representative ensures that the CRF is complete and interfaces with the requesting party to collect additional information as required. The steps identified for this activity are listed below and are discussed in the following paragraphs.

- Submit Change Request (CR)
- Log CR into Change Request System
- Review CR

3.2.1.1 Submit Change Request (CR)

The submission of an ERA Change Request Form (CRF) initiates the process for approving changes to CIs that are placed under strict CM control. The CRF documents the information submitted for the CR and is entered and tracked through the ERA Change Request database. All ERA PMO team members, users, testers, or contractors can submit a CR through a CM representative. The CM representative will ensure that the CRF is complete and all required fields are entered. See the *Change Request Database Users Guide (CUG)* for more detailed information regarding the CRF and instructions for its completion. Additionally, **Section 3.3.1, CI Reporting**, lists the minimum elements for recording and tracking a CR.

3.2.1.2 Log Change Request (CR) into System

The CM representative is responsible for entering all change requests into the ERA Change Request database. The CM representative will ensure that all required fields have been completed. The CM representative identifies the functional area that the CR will impact for assignment to the appropriate Functional IPT for review. As discussed, the *CUG* provides detailed information for completing the CRF. Once the CR is entered into the ERA Change Request database, the status of the CR can be tracked through approval or disapproval. When the CM specialist logs the CR into the system, the initial state of the CR will be “**Submitted.**”

The Change Request database assigns a control number to each CR when entered, in the following format:

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CR-zzz-PMO-xxxx-y (e.g., **CR - ERA-PMO-DCMT-1**) where:

- CR – indicates Change Request
- zzz – indicates PMO Project
 - ERA – Electronic Records Archives
- PMO – indicates Program Management Office
- xxxx – this designates the type of change
 - BSLN – Baseline
 - DCMT – Document
 - HRDW – Hardware
 - OTHR – Other
 - SFTW -Software
- y – this number is increased by one (1) with each CR submitted with same type of change

3.2.1.3 Review Change Request (CR)

The CR will be assigned to the appropriate Functional IPT according to the functional area identified for the CR. The Functional IPT will review the CR for the following:

- Determine the completeness of the CR,
- Identify and request additional information needed to determine priority,
- Make the initial decision to proceed with further processing of the CR, and
- Assign the appropriate priority for the CR.
- Determine the type of change requested (Class I, II, or III)

There are three (3) levels of priority for a change request; routine, urgent, and emergency. CRs are prioritized according to the descriptions as discussed in **Table 3-6, Change Request Priority Descriptions**. CRs that are prioritized as routine will follow the normal change request process. CRs that are prioritized as emergency or urgent may follow the emergency change request process as detailed in **Section 3.2.5**.

CR Priority	Description
Routine Change Request	A CR is prioritized as routine if change will not have a serious or significant impact to the integrity, security, or effectiveness of the ERA system, and if impact to program schedule, cost, or potential loss of cost savings is minimal.
Urgent Change Request	A CR is prioritized as urgent if the delay in implementing a change may significantly impact the integrity, security, or effectiveness of the ERA system, result in significant loss of cost savings, or hinder schedules to be met.
Emergency Change Request	A CR is prioritized as an emergency if the delay in implementing a change may seriously compromise the integrity, security, or effectiveness of the ERA system or have a major impact on program schedule or cost.

Table 3-7: Change Request Priority Descriptions

Additionally, there are three types of classes for change requests that the functional IPT must decide for each CR and these classes are discussed in **Table 3-8** below.

CR Class	Description
Class I Change	A CR identified as a Class I change represents an engineering change that impacts system functionality and/or baselined system CIs and may have significant impact to cost or schedule. Class I changes must submit an engineering change proposal (ECP) and be reviewed by the ERB.
Class II Change	A CR that is classified as a Class II change represents a non-engineering change that does not change system functionality but may have significant impact to cost or schedule or is an engineering change that affects system functionality with little or no impact to cost or schedule. Class II changes will submit a change proposal and are not reviewed by the ERB.
Class III Change	A CR that is classified as a Class III change represents a non-engineering change that does not affect system functionality and has little or no impact to cost or schedule. A Class III change does not require a change proposal and is not reviewed by the ERB.

Table 3-8: Change Request Type Descriptions

If the CR is not approved for further processing, the CM specialist notifies the requestor of the decision and closes the CR. (Refer to **Section 3.2.4.5**)

3.2.2 Evaluating Changes

The evaluation of a change is an important activity of the change request process to validate justification for the change and to assess the impact of the proposed change to the system, affected configuration items, system schedule and budget. For the ERA program, change requests are submitted to request the change, and change proposals are prepared to document the impact of the proposed change. There are two types of CPs; CPs for class II changes and Engineering Change Proposals (ECPs) for class I changes. Change proposals are normally prepared by a functional or technical expert, but may require detailed analysis to be provided by the development contractor. The Engineering Review Board (ERB) will review all ECPs and make recommendation to the CCB for acceptance or rejection of the proposed change.

The steps involved in the evaluation of a change are listed below and discussed in the following paragraphs.

- Review Change Request for Disposition
- Assign Change Request to Responsible Person or Organization
- Prepare Engineering Change Proposal or Change Proposal
- Review Engineering Change Proposals and Provide Recommendation

3.2.2.1 Review Change Request (CR) for Disposition

The ERA PMO CCB is the authoritative decision-making body for deciding the disposition of CRs, Engineering Change Proposals (ECPs), Change Proposals (CPs), and changes, for all CIs placed under strict CM control. CCB members will meet at regularly scheduled CCB meetings to review submitted CRs and CPs to decide disposition. CCB activities and responsibilities are described in the CCB Charter.

The CCB will determine the disposition for the CR. The possible dispositions to be decided for a CR are listed below.

- Disapproved (provide the reason for disapproval)
- Approved for current release (record the release on the CRF)
- Approved for next release (record the release on the CRF)
- Immediate change (Emergency or urgent change) – See **Section 3.2.5, Emergency Change Requests**
- Defer for later discussion (based on time constraints, cost, budget, or triggered by a date or an event.)
- Assign for further study (record assignment as an action item in the ERA Action Item Database)

If the CR is disapproved, the CM Specialist notifies the requestor of the decision and closes the CR. (Refer to **Section 3.2.4.5**) If the CR is deferred for later discussion or assigned for further study, the CM specialist updates the state of the Change Request to “*Deferred.*”

3.2.2.2 Assign Change Request (CR) to Responsible Person or Organization

If the CR has been approved by the CCB, the CCB will assign the CR to the responsible person or organization for further action. There are two (2) possible actions that can proceed and depends upon the CR type class. If the CR has been categorized as a class I or class II type change, then an ECP or CP is required according to the description in **Table 3-8** and the CR is assigned to the responsible party or organization to prepare the CP and to perform the impact analysis for the proposed change. (Refer to **Section 3.2.2.3**) If the CR has been categorized as a class III type change, then a CP is not required and the CCB assigns the CR to the responsible party or organization to implement the change. (See **Section 3.2.4.2**)

When a CR is assigned to a responsible party or organization, the CM Specialists changes the state of the CR to “*Opened.*” The CM Specialist creates an action item against the CR, with a description of the assigned action, the CR identifier, action item owner name, action item date, and action item due date, which is recorded in the Action Item Database and tracked.

3.2.2.3 Prepare Change Proposal (CP)

A responsible party or organization will be assigned by the CCB to prepare a CP or ECP. CP’s and ECP’s record the impact of the proposed change on the affected CIs and baselines. The assigned party reviews the CR and proposed change to assess impact and to identify alternative

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solutions. The assigned party completes the Change Proposal Form (CPF) and records a summary of impact and suggests alternative solutions if applicable. The *CUG* provides detailed information for completing the CPF. When the CPF is completed, the assigned party submits it for review according to the type of change submitted, CP or ECP. All ECP's will be reviewed by the ERB and the CCB and CP's will only be reviewed by the CCB. **Section 3.3.1, CI Reporting**, lists the minimum elements for recording and tracking ECP's and CP's.

3.2.2.4 Review Engineering Change Proposal (ECP) and Make Recommendations

The ERA PMO ERB is the authoritative body for conducting reviews of technical evaluations of ECPs. The ERB works with the CCB to evaluate technical, schedule, and cost impacts for proposed changes and to consider alternative solutions. The ERB will meet regularly to review submitted ECPs for technical merit and to make recommendations to the CCB. ERB Activities and responsibilities are discussed in the ERB Charter. The ERB submits the ECP and their recommendations to the CCB to decide disposition of the proposed change(s).

3.2.3 Approving or Disapproving Changes

The ERA Configuration Control Board (CCB) is the decision-making authority for the approval or disapproval of all ERA configuration items that are placed under strict configuration control. (see the *CCB Charter*) Currently, the ERA program maintains only one official CCB. However, additional CCBs may be required to adequately represent and control changes to the system and system interfaces in the future. Additional CCBs and their level of authority and responsibilities will be reviewed throughout the program life cycle to ensure that adequate control and representation is defined. The ERA CCB will review all proposed changes to decide disposition as defined in the section below.

3.2.3.1 Review Change for Implementation

The CCB reviews all CP's and ECP's and their recommendations as submitted by the ERB to decide disposition for the proposed change(s). The CCB will decide if the proposed change should be implemented or if an alternative solution will be used. Additionally, if a change is approved for implementation, the CCB will be responsible for ensuring that adequate resources are assigned to acquire, develop, or revise the configuration item.

The CCB will decide disposition for the CP and implementation of the change. The possible dispositions to be decided for a CP are listed below.

- Disapproved (provide the reason for disapproval)
- Approved for current release (record the release on the CPF)
- Approved for next release (record the release on the CPF)
- Immediate change (Emergency or urgent change) – See **Section 3.2.5, Emergency Change Requests**
- Defer for later discussion (based on time constraints, cost, budget, or triggered by a date or an event.)

- Assign for further study (record assignment as an action item in the ERA Action Item Database)

If the CP or ECP is disapproved, the CM Specialist notifies the requestor of the decision and closes the CR and CP or ECP. (Refer to **Section 3.2.4.5**) If the CP or ECP is deferred for later discussion or assigned for further study, the state of the CP or ECP is changed to “**Deferred.**”

3.2.4 Implementing Changes

When a change has been approved, a series of steps are required to implement, verify, accept and close out the change. These steps are discussed in the paragraphs below.

3.2.4.1 Assign Change to Responsible Person or Organization

Once a CP or ECP is approved, the CCB will assign the proposed change to a responsible party or organization for implementation. When a change is assigned to a responsible party or organization for implementation, the CM Specialist changes the state of the CR to “**Assigned.**” The CM Specialist creates an action item against the CP or ECP, with a description of the change to be implemented, the CP or ECP identifier, action item owner name, action item date, and action item due date, which is recorded in the Action Item Database and tracked.

3.2.4.2 Implement Change

The assigned party or organization will implement the tasks as specified for the change according to program development plans and guidelines. When work begins on a task, the CM Specialist will change the status of the action item to “**Opened.**” The CM Specialist may change the status of the action item to “**Pending**” if additional information or resources is needed to complete a task. When all tasks against the action item have been completed, the CM Specialist will change the status of the action item to “**Closed**” and will update the CR to “**Implemented.**” The date that the change is implemented is recorded for the action item. The change will be submitted to the ERA PMO according to documented procedures for product delivery. (Note: The specification of delivery procedures for work products to the ERA will be developed at contract award when additional information is provided.)

3.2.4.3 Verify Change

When the change has been implemented and delivered to the ERA PMO, verification of the change will be performed by the ERA Testing team and the QM team according to documented procedures. (See the *QMP* and the *TSP* respectively). The Testing team will validate that all system and software changes are implemented correctly and have been properly validated with testing. The QM team will verify that all other changes, such as changes to configuration documentation or correction to configuration items that do not affect the systems “form, fit, or function” have been properly implemented and verified. Changes must be verified and signed by the ERA Testing team or the QM team, as appropriate, and they submit recommendation for acceptance or rejection of the change as implemented. The QM Officer will then update the CR to “Verified” and the date that the change is verified is recorded for the change request.

3.2.4.4 Accept or Reject Change

Once verified, the change is submitted to the CCB for acceptance or rejection. The CCB will review the change along with the recommendations submitted by the Test team or QM team to decide to accept or reject the change as implemented. If the change is rejected, it is re-submitted to the assigned party for implementation as specified, and the state of the change request returns to “Assigned”. If the change request is accepted, the CCB submits the change request to the CM specialist for close out.

3.2.4.5 Close out Change

When the change has been accepted by the CCB, there are a number of tasks that are required to be performed in order to close out the change. The CM specialist will perform the following tasks to close out the change:

- Place the configuration item into the CM library
- Plan and execute the configuration item for release
- Update the new baseline
- Notify requestor and all affected parties

When the above tasks have been completed, the CM specialist will update the status of the Change Request to “*Closed*” and record the date that the change request was closed.

3.2.5 Emergency Change Requests (CRs)

The Change Request process identified in the preceding paragraphs applies to change requests that are prioritized as routine. When a change request is identified for an emergency fix, the change request process is shortened to minimize the time for approval and implementation. (Refer to **Section 3.2.1.3** for guidelines on prioritizing change requests as emergency, urgent, or routine).

When a change request is prioritized as “emergency” or “urgent”, the CCB Chairperson may elect to bypass steps as necessary to accomplish immediate approval for the change request. The normal two-cycle process for reviewing and approving a change request may be shortened to a one-cycle process in which the CR is both reviewed and evaluated at the same CCB meeting. The one-cycle process shortens the time for review.

For an emergency CR, the CCB Chairperson may directly assign the change proposal to the functional or technical expert for preparation without initial approval from the CCB. Review of the CP by the ERB may be bypassed, or performed by a subset of the ERB for faster review and recommendation. Additionally, the CCB Chairperson has the authority to call an emergency CCB meeting to review and approve an emergency or urgent CR for implementation rather than to wait until a regularly scheduled meeting is held.

If the emergency CR is approved by the CCB, the change will be assigned to a responsible party or organization and will have a high priority for implementation. The implemented change will

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still be required to be verified by QM or Testing as appropriate, but the CCB Chairperson or a subset of the CCB may convene an emergency CCB meeting to decide immediate acceptance or rejection for the change. Finally, the CM Specialist will close out the emergency CR as expeditiously as possible, and an emergency release may be performed depending on the immediacy of the change required.

3.2.6 Change Request (CR) State Descriptions

Table 3-8, Change Request State Descriptions, lists the definitions for the possible states for a CR and the responsible party who should be notified when the CR is in each specified state.

State	Definition	Access Control
Submitted	This state may occur as a result of 1) the submission of a new CR, 2) the update of an existing CR, or 3) consideration of a deferred CR.	Any Requestor CM Specialist CCB
Opened	This state initiates the evaluation of a CR to 1) determine if the CR is within scope for further review, 2) assess the impact that the proposed change will have to the affected CIs, 3) decide disposition for implementing the change.	CCB ERB Functional/Technical Expert
Assigned	In this state, the CR has been approved and the work has been assigned to a responsible party or organization. It is the responsibility of the CM Specialist, PD, and COR to coordinate the additional work and update the schedule as appropriate.	CM Specialist COR PD Contractor Development Manager
Resolved	This state indicates that the assigned change has been fixed and is ready for verification.	COR Contractor Development Manager QM Manager Test Manager
Verified	This state signifies that the change has been implemented and verified in a test build and is ready to be included in a release.	QM Manager Test Manager CM Integrator CCB
Closed	This is the final state of a CR and signifies that no further action is required. A CR may be closed: 1) after it has been verified by QM or Test, and approved for release by the CCB, 2) after submission if the CR is not selected for further processing, 3) after it is opened and reviewed if the CR is not determined to be within scope, 4) after review of the CP if the change to be implemented is not determined to be within scope.	CM Specialist CCB Requestor

State	Definition	Access Control
Deferred	This state signifies that further action is required, such as 1) additional information is required to attain a decision, 2) an implemented change failed testing, 3) CR may be considered out of scope for the current release(s). CRs that are deferred may be Submitted again for re-evaluation, or may be Closed with no additional action required.	CM Specialist CCB Requestor

Table 3-8: Change Request State Descriptions

3.3 Configuration Status Accounting

Configuration status accounting is an activity of CM that is concerned with the recording and reporting of information required to effectively manage the configuration of a system or product. Configuration status accounting activities collect data that can be used to measure various aspects of program effectiveness and to assess product completeness and quality. The five (5) primary types of configuration status accounting reports identified for the ERA program are listed below and discussed in the following sections.

- CI Reporting
- CR Reports
- System Build Reports
- Audit Reports
- CM Metric Reports

3.3.1 Configuration Item Reporting

Activities performed during configuration identification provide the basis for uniquely identifying, tracking, and reporting CIs. In addition, the adequate selection of CI attributes is critical for providing the level of detail necessary for the creation of informative and useful reports. The following data attributes have been identified for the tracking and reporting of each CI.

CI Elements

- CI Identifier
- CI Name
- CI Version
- CI Date Approved
- * CI Status (opened, developed, verified, approved, implemented)
- * CI Owner (Creator/Developer)

CR Elements

- CR Identifier
- CR Priority
- CR Severity
- * CR Type (Defect/Enhancement)
- * CR Class (Class I, II, or III)
- CR Date Submitted
- * CR Life Cycle Phase Submitted
- CR Submitter (Requestor)
- CR Approval/Disapproval Status
- CR Approval/Disapproval Date
- Description of Change
- Affected Configuration Items
- Impact Analysis of Change

Change Elements

- Change Assigned To
- * Change Implementation Status
- * Change Implemented Date
- * Change Implemented Life cycle Phase

(Note: Items marked with an asterisk (*) indicate elements for future implementation)

Two (2) status reports related to CIs that have been identified for the ERA program are listed below and discussed in the following paragraphs.

- CI Status Reports
- CI History Reports

3.3.1.1 Configuration Item (CI) Status Reports

A status report for a CI shows status information and outstanding CRs for each CI. CI status reports will be generated prior to system builds, increments, and releases to show the completeness and readiness of the CI to be included for the build or release. The following information will be collected for a CI status report:

- CI Identifier
- CI Name
- CI Version
- CI Status
- CI Owner (Creator/developer)
- CI Release Date

- CI Report Date
- Outstanding CRs (CR Identifier, CR Status, CR Date, CR Assigned To)

3.3.1.2 Configuration Item (CI) History Reports

The CI history report provides a listing of the CI, which is a delivery itself, and each subdelivery (release) of the CI. The CI history report provides the ability to trace all changes and releases for a particular CI. A CI history report provides relevant information to assess the general stability and completeness for a CI and will be generated prior to system builds, increments, and releases. The following information will be collected for a CI history report.

- CI Identifier
- CI Name
- Change log with version, status, date, release date and approving authority, CR, and assigned CI owner for every new version (release) of the CI

3.3.2 Change Request (CR) Reporting

A CR is used to request a change to a CI that has been baselined and placed under CM control. ERA uses a CRF to document the submission of a request and to track its status; and CPFs are used to document the evaluation of the potential impact of a change to the affected CIs. CR reports provide useful information about the quality of the product, trends in defect reporting, and the general quality of the configuration control process. CR reports identified for the ERA program are grouped into three (3) main categories.

- Aging (Time based reports)
- Distribution (Count based reports)
- Trend (Time and count related reports)

CR reports that have been identified for the ERA program are discussed in the following paragraphs.

3.3.2.1 Aging

Aging reports show how long a CR remains within a selected category over a specified period of time. Aging reports identified for the ERA program show the number of CRs that have been requested over a specified period of time (e.g., weekly, monthly, per release, per increment, per phase) for the following categories.

- Submitted
- Assigned
- Resolved
- Priority
- Severity
- State

3.3.2.2 Distribution

Distribution reports for the ERA program show the number of CRs that meet the specified criteria for the following categories.

- * By Owner (creator/developer)
- By Submitter (Requestor)
- By Priority
- By Severity
- * By Type
- * By Life cycle Phase (CR Identified, CR Approved/Disapproved, Change Implemented)
- By Change Assigned To

3.3.2.3 Trend

Trend reports show the rate at which requests are transitioned into other categories or states. Trend reports identified for the ERA program show the following:

- * Number of requests transitioned into selected states by day, week, or month
- * Rate at which requests move into selected states

(Note: Items marked with an asterisk (*) indicate planned reports for future implementation)

3.3.3 System Build and Release Documents

A system build identifies a set of activities that is associated with the compilation and processing of a distinct set of CIs and components to derive a consistent version of the system or subsystem. A release is a system build that has successfully completed a specific development phase and is released to a subsequent development phase, such as from system testing to acceptance testing. A build plan is used to identify the selected CIs, components, build instructions, and related documentation that comprise the build. A Version Description Document (VDD) describes the contents of the system release, along with the status of the CIs, changes implemented, existing defects, and installation procedures. Detail on the minimum content for a build report and a VDD is provided in the following paragraphs.

3.3.3.1 Build Plan

The Build Plan provides information to document specific build activities for the system. The Build Plan will, at a minimum, provide the following information:

- **Introduction** – Provides an introduction to the document and the documents organization
- **System Overview** – Provides a brief description of the system or subsystem
- **Build Description** – Provides a list of the CIs that are to be implemented in this build and states the preferred order in which the CI or subsystem should be implemented.

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- **Build Instruction** – Provides the instructions for each build and specifies how the build is to be constructed, the criteria for its assessment, and how it is to be tested.

3.3.3.2 Version Description Documents (VDDs)

It is critical to provide an accurate description of all major releases and increments of the ERA system to identify the components included in the release, applicable changes, identified defects, and installation requirements and instructions. The Version Description Document (VDD) is prepared for each major release or increment of the ERA system, and provides the following information:

- **Introduction** – Provides an introduction to the document and the documents organization
- **System Overview** – Provides a brief description of the system or subsystem
- **Release Information** – Provides a description of system interfaces and dependencies
- **Version Description** – Provides an itemized list of all CIs included in this release (includes CI identifier, name, version, status, and description). Also lists all CRs addressed by this release
- **Installation Instructions** – Provides instructions for installing the release as part of the system
- **Outstanding Change Requests** – Provides a list of outstanding CRs not incorporated in this release
- **Possible problems and known defects** – Provides a list of known defects and workarounds
- **Recovery Instructions** (if applicable) – Provides instructions for recovering the system to the previous configuration if required.

3.3.4 Audit Reports

The primary objectives of configuration audits are to determine if selected system products meet functional and physical requirements and are complete as delivered; and to assess the products readiness to be baselined or released. Audits of CM activities are also performed to assess effectiveness and to identify areas for improvement. Configuration audits are discussed in detail in **Section 3.4**. Configuration audit reports capture audit findings and documents discrepancies with corrective actions and estimated completion dates. Configuration audit reports identified for the ERA program include the following.

- FBL Audit Report
- ABL Audit Report
- Unscheduled Baseline Audit Report
- FCA Report
- PCA Report

Configuration audit reports for the ERA program are discussed in the following paragraphs.

3.3.4.1 Functional Baseline (FBL) Audit Report

The purpose of the FBL audit report is to document traceability between system concepts and high-level requirements to the lower level system requirements specification as determined from the FBL audit. The FBL audit will be performed at the completion of requirements specification and may be performed following a System Requirement Review (SRR).

Name:	Functional Baseline (FBL) Audit Report
Purpose:	The purpose of the FBL audit report is to provide verification of traceability between system concepts and requirements and to provide evidence that system requirements are complete, correct, and consistent.
Methods:	Verification of requirements traceability can be accomplished through inspection or review. Findings from an SRR may be used as an input for review and verification of the traceability for the system requirements.
Inputs:	<i>ERA ConOps, ERA RD, SyRS, SRR</i>
Outputs:	FBL audit findings, system requirements discrepancies, proposed corrective actions, estimated completion dates
Intended Audience:	ERA PD, COR, Division Managers, CM Specialist, QM Manager, Testing Officer, Respective Contract Developer Project Manager

Table 3-9: Functional Baseline (FBL) Audit Report

3.3.4.2 Allocated Baseline (ABL) Audit Report

The purpose of the ABL audit report is to document the results from the ABL audit that the system design is sufficiently detailed and traceable to the baseline system requirements to enable correct coding and development. Additionally, the ABL audit verifies that all requirements have been closed out prior to the establishment of the design baseline. The design baseline audit will be performed at the completion of detailed design specification and may be performed following a System Design Review (SDR).

Name:	Allocated Baseline (ABL) Audit Report
Purpose:	The purpose of the ABL audit is to provide verification of traceability between system requirements and system design specifications and to verify that design is sufficiently detailed for complete and correct development to proceed.
Methods:	As for the FBL audit, verification of design completeness traceability can be accomplished through inspection or review. Findings from an SDR may be used as an input for review and verification of the traceability for the system design.
Inputs:	SyRS, SRR, SARAD, SDR
Outputs:	ABL audit findings, system design discrepancies, proposed corrective actions, estimated completion dates

Intended Audience:	ERA PD, COR, Division Managers, CM Specialist, QM Manager, Testing Officer, Respective Contract Developer Project Manager
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Table 3-10: Allocated Baseline (ABL) Audit Report**3.3.4.3 Unscheduled Baseline Audit Reports**

Unscheduled baseline audit reports are used to document the results of an unscheduled baseline audit to assess system progress attained to a specified point within a phase, release, or increment against established plans or expectations. Unscheduled baseline audit reports may be performed when system progress is perceived to be uncertain and intervention may be required.

Name:	Unscheduled Baseline Audit Report
Purpose:	The purpose of the unscheduled baseline audit report is to determine the progress of the system and deliverables against an established plan or schedule and to identify existing barriers to further progress.
Methods:	The unscheduled baseline audit can be accomplished through inspection and review of program information that measures the progress, such as open CIs, open CRs, and various configuration status accounting and metrics reports against approved program schedules and plans.
Inputs:	ERA Work Breakdown Structure (WBS) and schedule, program plans, program deliverables, various configuration status reports, including CI status report, CI history reports, CR reports (aging, distribution, trend reporting), system build reports, audit reports, and CM metric reports (as applicable).
Outputs:	Unscheduled baseline audit findings, baseline discrepancies, proposed corrective actions, scope or CRs, realigned schedules and/or cost projections
Intended Audience:	ERA PD, COR, Division Managers, CM Specialist, QM Manager, Testing Officer, Respective Contract Developer Project Manager

Table 3-11: Unscheduled Baseline Audit Report**3.3.4.4 Functional Configuration Audit (FCA) Reports**

The goal of the FCA report is to document results of the FCA that the deliverable code and system components are validated against requirements. The FCA will generally be performed towards the end of concept development and prior to system production for each increment as discussed in **Section 3.4**.

Name:	Functional Configuration Audit (FCA) Report
Purpose:	The purpose of the FCA report is to provide verification that the implemented system to be released meets approved requirements specifications.

Name:	Functional Configuration Audit (FCA) Report
Methods:	Validation of system functionality can be performed by review of approved test plans, test specifications, and test reports; review of traceability matrix of test cases and test results to system requirements; and verification of test results by test team.
Inputs:	ERA RD, SyRS, test plans, test specifications, test reports, traceability matrix
Outputs:	FCA findings, traceability verification matrix, discrepancies, proposed corrective actions, estimated completion dates
Intended Audience:	ERA PD, COR, Division Managers, CM Specialist, QM Manager, Testing Officer, Respective Contract Developer Project Manager

Table 3-12: Functional Configuration Audit (FCA) Report

3.3.4.5 Physical Configuration Audit (PCA) Reports

The goal of the PCA report is to document results of the PCA that the system deliverables required agree with the items physically listed and present in the product release. The PCA, along with the FCA will generally be performed towards the end of concept development and production and prior to system operation for each release as discussed in **Section 3.4**.

Name:	Physical Configuration Audit (PCA) Report
Purpose:	The purpose of the PCA report is to provide verification that the items identified to be released agree with existing documentation.
Methods:	Validation of physical configuration can be performed by an inspection of the system documentation against the items physically listed and present in the product release.
Inputs:	System deliverables, source code, executables, build reports, release notes, version description documents
Outputs:	Physical configuration audit findings, discrepancies, proposed corrective actions, estimated completion dates
Intended Audience:	ERA PD, COR, Division Managers, CM Specialist, QM Manager, Testing Officer, Respective Contract Developer Project Manager

Table 3-13: Physical Configuration Audit (PCA) Report

3.3.5 Configuration Management (CM) Metrics Reports

The purpose of CM metrics is to measure CM and program performance. CM metrics also can be used to review and revise existing CM processes and procedures throughout the project life cycle. The data derived from metrics is used to understand problems and inefficiencies in products and processes, to address the extent of those problems and inefficiencies, and to provide insight for making necessary corrections and improvements. Details of the metrics program are found in the *ERA MP*. The following metrics report will be generated per each build or release.

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- Total number of defects found during the reporting period.
- Cumulative number of defects found during all reporting periods combined.
- Total number of defects found per severity level (i.e., Critical, High, Intermediate, and Low).
- Cumulative number of defects closed per severity level (i.e., Critical, High, Intermediate, and Low).
- Total number of defects found per origin (i.e., Documentation, Requirements, Architecture, Design, Code, Test, and Other).
- Percentage of defects by severity level = number of defects for a severity level divided by total number of defects.
- Total number of defects closed by severity level, as of the end of the reporting period.

3.3.6 Configuration Status Accounting Reporting Frequency

Timeliness is an important quality for configuration status accounting reporting. To ensure that configuration status accounting reports are received at the proper frequency required to provide meaningful information for informed decision making, a schedule for reporting frequency should be established. The reporting frequency as defined for the configuration status accounting reports for the ERA program are provided in **Table 3-14, Configuration Status Accounting Reporting Frequency**.

Table Name	Reporting Frequency				
	Weekly	Monthly	By Release	By Increment	By Phase
CI Status Reports			√	√	√
CI History Reports			√	√	√
CR Aging Reports	√	√	√	√	√
CR Distribution Reports	√	√	√	√	√
CR Trend Reports	√	√	√	√	√
Build Reports			√	√	√
Version Description Document			√	√	√
Functional Baseline Audit Reports					End of Concept Exploration (Requirements Specification) at each increment
Allocated Baseline Audit Reports					Start of Concept Development (Design Specification) at each increment

Table Name	Reporting Frequency				
	Weekly	Monthly	By Release	By Increment	By Phase
Unscheduled Baseline Audit Reports			As required	As required	As required
FCA Reports					End of Concept Development at each increment
PCA Reports					End of Concept Development at each increment

Table 3-14: Configuration Status Accounting Reporting Frequency

3.3.7 Configuration Status Accounting Reporting and Collection

As discussed in **Section 3.1.3.1**, PVCS is the repository that maintains the CML. In addition, two databases are used for managing change requests and action items, the Change Request Tracking System (CRTS) and the Action Item database, respectively. (See **Section 5.2** for a discussion of the CM tools.) Currently, PVCS is used to generate the accounting reports for the CIs maintained within the CML. Additionally, a manual report is created to track change request and change proposal information including, change request control number, requestor, request date, approval date, priority, request status, approver, and document title.

ERA is planning to implement Rational tools, which will improve current reporting capability by integrating various activities, such as requirements management, version control and baseline management, defect and change tracking, and test management to provide for more robust reporting and by automating several reports that are presently manually created.

Procedures for generating accounting reports for the PVCS system can be found in the *Configuration Management PVCS Procedures (CPP)* document.

All CIs, CM documents, and configuration status accounting reports as described in this section and throughout the CMP will be managed as records of the PMO. All ERA records will be managed in accordance to the ERA records schedule as defined in the ERA File Plan (FP). Please refer to **Section 4.2** for additional information regarding the ERA FP.

3.4 Configuration Audits and Reviews

Configuration audits are performed to determine if the configuration item accurately reflects the physical and functional characteristics as defined. Reviews are performed to ensure that configuration items have been correctly identified and produced. A discussion of configuration audits and reviews proposed for the ERA program will be provided in the following paragraphs.

3.4.1 Configuration Audits

Configuration audits are performed to verify that configuration items meet functional and physical requirements as documented and are complete as delivered. Configuration audits establish the baselines for the ERA Program at specified milestones (see **Section 3.1.1.1** for details regarding ERA baselines.).

3.4.1.1 Functional Baseline (FBL) Audit

CM will conduct an FBL audit to verify that requirements adequately specify system concept and are complete, correct, and consistent. The FBL audit may be accomplished by inspection of the SRR report and results. The FBL will be performed following the SRR and will establish the functional baseline.

Items for review at the FBL audit will include:

- *ERA Conops*
- ERA RD
- SyRS
- SRR
- SRR Results/Reports

3.4.1.2 Allocated Baseline (ABL) Audit

CM will conduct an ABL audit to verify that the design specified sufficiently details and is traceable to the requirements allocated from the functional baseline. The ABL audit will also be performed to ensure that all requirements are closed out and approved before the allocated baseline is established. The allocated baseline audit establishes the allocated baseline. The ABL audit will be performed following the system design review.

Items for review at the ABL audit will include:

- SyRS
- SARAD
- Traceability Matrix
- SDR
- SDR Results/Reports

3.4.1.3 Unscheduled Baseline Audit

CM may conduct an unscheduled baseline audit when system progress is perceived to be uncertain or requires intervention. Unscheduled baseline audits are performed to assess system progress to a specified point and may be performed within a phase, release, or increment.

An unscheduled audit may review the following:

- Open CIs
- Open CRs and CR status reports
- Program schedule and plans
- Various status accounting reports and metric reports

3.4.1.4 Functional Configuration Audit (FCA)

CM will conduct an FCA to verify that each configuration item has adequately achieved the performance and functional characteristics as specified in the functional or allocated baselines. The FCA is typically accomplished by auditing test results to verify that each configuration item performs in compliance with specified performance and functional requirements and design. The FCA will generally be performed towards the end of concept development and prior to system production for each increment.

Items to be reviewed include:

- Test plans, specifications and test results are verified that the CI performs as required by the allocated baseline.
- Traceability matrix is verified to trace top-level requirements through preliminary and detailed design to test cases.
- Technical manuals (e.g. system operating manuals, support documents) are verified for accuracy, completeness, and effectiveness of use.

Details regarding the conductance of the FCA will be provided upon contract award when additional information is available.

3.4.1.5 Physical Configuration Audit (PCA)

CM will conduct a PCA to verify that the product to be delivered is identical to the product that has been tested and verified and to ensure that the configuration identification submitted for audit accurately represents the “as-built” product. The PCA will be held prior to any system release. The FCA and PCA establish the product and production baselines, respectively.

Items for review at the PCA will include:

- Final draft version of each CI to be audited
- CI Identification and CSA information for each CI
- CI specification and all approved changes
- Final draft versions of technical documents, such as system operating and support documents
- Acceptance tests results

Details regarding the conductance of the PCA will be provided upon contract award when additional information is available.

3.4.2 Reviews

System design will evolve through a series of stages for the ERA program; from concept exploration, through concept development and initial production. As the design evolves, an evaluation of the completeness and adequacy of the design must be performed at critical milestones throughout the life cycle of the system to ensure that system design is sufficient for subsequent design and development to proceed. Design reviews will be performed by the development contractor and verified by the ERA QM team to assess suitability of the design specification for meeting desired system functionality. (See the *QMP* for a discussion of ERA design reviews).

The CM team will participate in the following design reviews to ensure that system products have been correctly identified and that all CRs have been resolved. Reference the *ERA Technical Review Process (TEP)* document for additional information on the review process.

- SyRR
- SDR
- CDR

A discussion of design reviews identified for the ERA program is provided in the following paragraphs.

3.4.2.1 System Requirements Review (SyRR)

The initial stage of system design evolves from the identification of need to the specification of system requirements. In this stage, system design is specified in functional terms of desired performance and operation. The formulation of system requirements at this stage is critical because it establishes the foundation upon which all subsequent design and development activities can proceed. The purpose of System Requirements Review (SyRR) is to verify the adequacy of system requirements to completely describe the desired system. CM will support QM in conducting or verifying the SyRR. The SyRR will typically be performed towards the start of the concept development phase for each increment after the SyRS is completed.

3.4.2.2 System Design Review (SDR)

The subsequent stage of system design proceeds with the evolution from system requirements specification to system design specification, which is the allocation of system requirements into lower-level design specifications to the subsystem and CI level and below. At this stage, design criteria are established and trade-off analysis studies are performed to support decision decisions. The System Design Review (SDR) is performed to verify the system design to sufficiently detail system requirements and to validate design decisions. CM will support QM in conducting or verifying the SDR. The SDR will be performed at concept development for each increment when the SARAD is in development.

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3.4.2.3 Critical Design Review (CDR)

In the final stage of system design, detailed design of subsystems, components, and units proceeds from the system design allocation. Activities to realize the system design are performed, including the detailed design specification of lower level subsystems and components, procurement of COTS products, and the integration of system components. The Critical Design Review (CDR) is performed to verify the adequacy of the detailed design to sufficiently detail the lower level subsystems, components and units derived from the system design and to validate design decisions. CM will support QM in the conductance or verification of the CDR. The CDR will be performed during concept development after detail design has been completed.

3.5 Interface Control

The Interface Requirements Document (IRD) is currently being drafted to identify critical interfaces to the ERA systems and the owners to these systems, and to specify the interface requirements for the ERA system. To coordinate changes to configuration items for ERA with changes to interfacing systems, Interface Control Working Groups (ICWG) will be established as required for each interfacing system. The ICWG will assume decision-making authority for reviewing and approving proposed changes to intersystem interfaces and will include participants from both programs, and will also include a representative from the ERA CCB. Specific roles and responsibilities for each ICWG will be described in an ICWG charter for each interfacing system, which will provide for the governance of the ICWG. Each ICWG will work closely with the ERA CCB to approve and release CIs for specified baselines. ICWGs for the ERA program will be determined once interfacing systems are identified and accepted. It will be the responsibility of the CM Specialist to work with the CM representatives of the respective intersystems to establish and support the ICWG.

3.6 Subcontractor/Vendor Control

The ERA contract will be awarded to as many as two (2) development contractors over a specified period of time for design selection. At the end of this period, a single contractor will be selected to develop the ERA system.

Each contractor will be required to submit a configuration management plan that will document the details for their respective CM program. The contractor's CMP will be consistent with the ERA CMP and the ERA Configuration Management Guidance (CMG) document. Additionally, the contractor's CMP and CM activities will be compliant with all contractual documents for the ERA program. The contractor's CMP must specify control for subcontractor activities; including subcontractor monitoring, audits and reviews to be performed, subcontractor change control process, and verification of all subcontractor deliverables. The contractor's CMP will be a deliverable to the ERA PMO and is subject to review and acceptance by the ERA PMO.

The ERA IV&V, QM, and CM teams will monitor contractors CM activities to assess compliance with contractor's procedures as defined in their CMP through regular reviews of status accounting reports, performance and/or participation of various reviews; including product

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reviews, process reviews, formal reviews, and in-process reviews (refer to the *COTP* for discussion of contractor reviews), and the conductance of specified audits, as discussed in **section 3.4.1**.

The *CCP* requires that a COR (or designated representative) participate in contractor's change control activities to monitor proposed changes or additions that may impact the scope, cost, or schedule of the project. Additionally, all proposed changes that may impact project scope, cost, or schedule, must be submitted as change requests for review and approval by the ERA CCB.

The *CCP* also specifies the ERA submission process by which the development contractor will submit deliverables, change requests, questions, action items, issues, and review item discrepancies (RIDs) to the ERA PMO. Following contract award, specific details for these submissions to discuss the actual "hand-off" of deliverables to the ERA PMO will be identified. The ERA CM will coordinate with each development contractor to ensure that this "hand-off" is performed in accordance with documented procedures and that deliverables will be appropriately placed under CM control.

The *COTP* specifies that each prime contractor will be responsible for managing their respective subcontractors. Subcontractors will be required to perform in accordance with the terms and conditions of the contract with NARA. Subcontractors beyond those that are included in the basic contract with NARA will require approval from the ERA COR. Finally, the ERA CO or designee must approve the subcontracting plan prior to subcontract award.

3.6.1 Subcontractor Products

It is the responsibility of the contractors to verify, through testing, that all subcontractor products meet the functional and physical requirements as specified for that CI. The contractor must ensure that all subcontractor products meet standards and are compliant with all applicable standards. Verification of deliverables must be performed at appropriate points of delivery by the contractor as specified in the subcontractor's plan, statement of work, or contract. Audits of subcontractor process must be performed at appropriate points as specified by the contractor in the subcontractor's contract, statement of work, or plan. Additionally, it is the contractor's responsibility to ensure that appropriate CM information and records from the subcontractor will be integrated into the contractor's CM system according to the subcontractor's contract, statement of work, or plan. The ERA PMO may periodically review the results of all subcontractor verification results, audits and reviews, and CM data.

3.6.2 Vendor Products

Vendor products selected for implementation in the ERA project must show evidence through test results that they meet functional and physical requirements. Additionally, all vendor products must show history of reliability, availability, and supportability as required by the project. The contractor will provide a unique identification scheme to fully identify all vendor products and to appropriately integrate them with the contractor's CIs. The contractor will provide a transition plan to specify how license agreements, leased products, warranties, and

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vendor support will be transferred to adequately provide for continued maintenance and support of all vendor products throughout the life cycle of the ERA system.

4.0 Configuration Management (CM) Schedules

This section discusses schedule information for the sequence and coordination of CM and CM-related activities, to include the ERA Records Management schedule for CM records.

4.1 General Configuration Management (CM) Activities Schedule

A list of planned CM activities and activity frequency for the entire life cycle of the ERA Program is provided in **Table 4-1, Frequency of CM Activities**. This list is not intended to be exhaustive and will continue to change as details of the ERA Program are expanded.

CM Activity	Frequency
CM Planning and Management	
Plan CM activities and resources	At program startup/ongoing
Provide Weekly Status Report	Weekly
Report CM activities to management	Monthly
Develop CM Guide	At program startup
Develop CM Plan	At program startup/ongoing
Update CM Plan	At defined milestones (See Section 6.0 Plan Maintenance)
Develop CM Standard Operating Procedures (SOP's)	At contract award
Develop CM Checklists	At contract award
Develop CM Forms	At contract award
Develop CM Templates	At contract award
Setup and maintain CM Environment	At program startup/ongoing
Establish and maintain CM Library	At program startup/ongoing
Archive CM records	At selected milestones and at close of ERA Program
Conduct CM Training	As defined in Section 5.5 /As needed
Configuration Identification	
Configuration Item Identification	At program startup/ongoing
Configuration Item Selection	At program startup/ongoing
Maintain Configuration Item List	Ongoing
Establish ERA Baselines	At defined milestones (see Section 3.1.1)
Update ERA Baselines	Ongoing
Create Software Builds	TBD
Change Control	
Manage Changes, Change Requests, and Change Proposals	Ongoing
Conduct CCB Meetings	Monthly (or as needed)

CM Activity	Frequency
Conduct ERB Meetings	Monthly (or as needed)
Configuration Status Accounting	
Collect Configuration Status Accounting information	Ongoing
Prepare Configuration Status Accounting reports	Ongoing, at specified schedules (see Section 3.3.6)
Collect Metrics	Ongoing
Prepare Metrics reports	Monthly
Configuration Audits and Reviews	
Conduct FBL Audits	At defined milestones (see Sections 3.3.4.1 and 3.4.1.1)
Conduct ABL Audits	At defined milestones (see Sections 3.3.4.2 and 3.4.1.2)
Conduct Unscheduled Baseline Audits	As Required
Conduct FCAs	At defined milestones (see Sections 3.3.4.4 and 3.4.1.4)
Conduct PCAs	At defined milestones (see Sections 3.3.4.5 and 3.4.1.5)
Provide Support to QM of CM Audit of processes and practices	Regularly, as scheduled by QM
Provide Support to QM of the SyRR	At defined milestones (see Section 3.4.2.1)
Provide Support to QM of the SDR	At defined milestones (see Section 3.4.2.2)
Provide Support to QM of the CDR	At defined milestones (see Section 3.4.2.3)

Table 4-1: Frequency of CM Activities

Additionally, the ERA WBS provides details for CM activities, schedule, sequence, task dependencies, and planned resources. The ERA WBS is currently defined through the concept exploration phase of the ERA life cycle. Details for this schedule will continue to be developed to include the entire ERA life cycle following the start of the Concept Development phase.

A proposed timeline for planned configuration management activities as they will be provided throughout the ERA life cycle is provided in **Figure 4-1, CM Activities for the ERA Life cycle**. The ERA system will be developed and released in multiple increments and releases. Many of the activities identified below will occur iteratively throughout the ERA life cycle for each system increment and release.

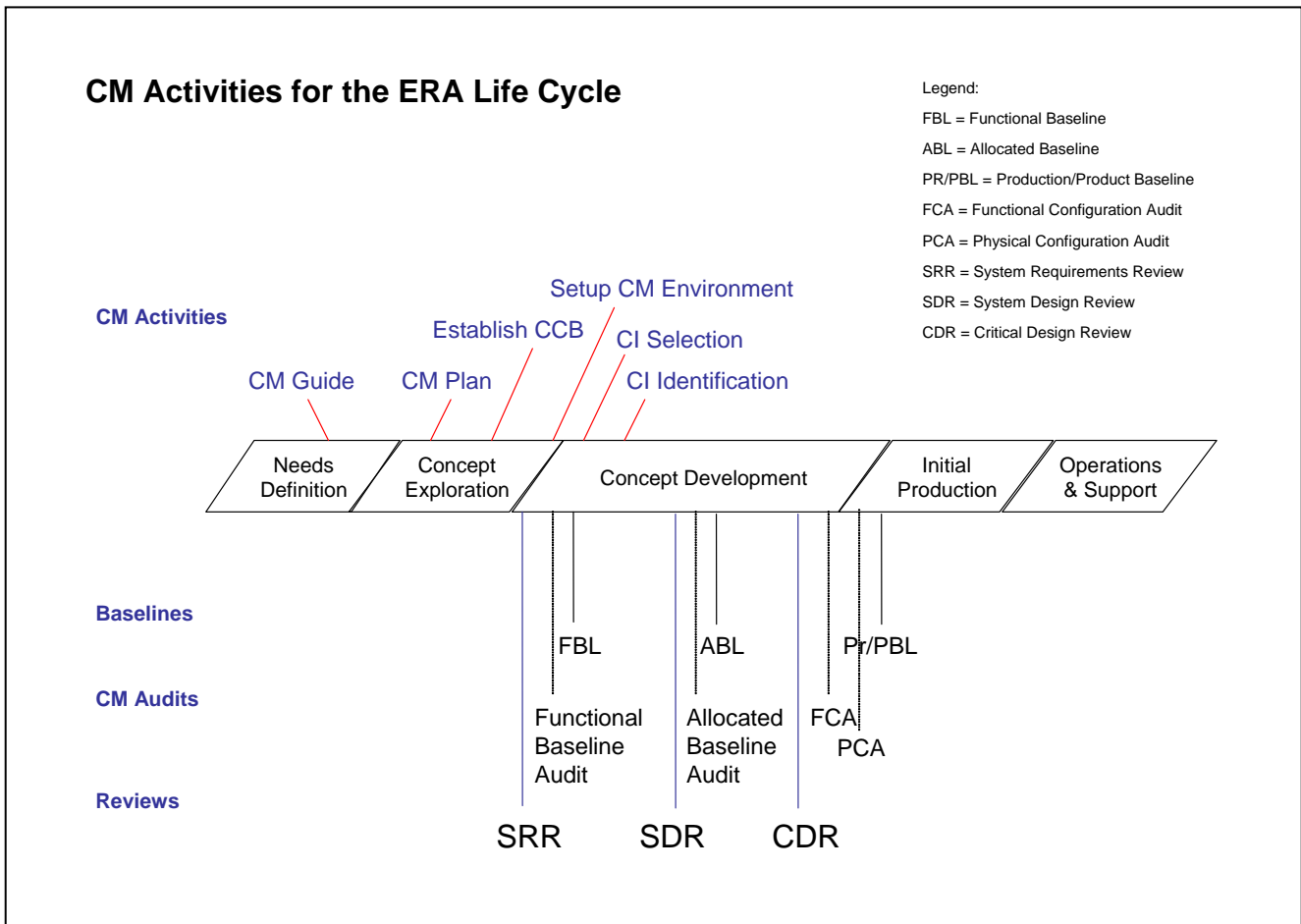


Figure 4-1: CM Activities for the ERA Life Cycle

4.2 Configuration Management (CM) Records Management Schedule

All documentary materials that control, report, and demonstrate execution of the CM function will be managed as records of the PMO. The CM Specialist and CM team members will collect and retain adequate and proper records of CM activities. The ERA PMO File Plan (FP) will provide a schedule for the adequate creation, maintenance and use, and disposition of all identified records for the ERA project. The FP is currently being drafted by the ERA PMO and once approved, will provide for the proper documentation and disposition of all specified CM records in accordance with the approved FP schedule.

5.0 Configuration Management (CM) Resources

This section discusses the products, software tools, hardware, personnel, and training required to implement CM activities for the ERA Program.

5.1 Configuration Management (CM) Organizational Products

A list of CM organizational products that will be developed by the ERA PMO to support the daily operation of CM activities for the ERA program is provided in **Table 5-1, CM Organizational Products**. An organizational product is any work product developed for the ERA that enables performance of PMO administration, technical, or management activities, such as SOPs, checklists, forms, templates, and ERA websites. Organizational products promote the consistency of activities performed across the PMO by specifying the procedures, tools, and techniques to be used for each task or process. Many of these organizational products have been identified for the PMO, but are currently in development. **Table 5-1** references the CM organizational products and indicates the status of each product, e.g., available, in development, or retired.

Title	Type	Description	Status	Location
Selecting and Approving CIs	SOP	Provides the procedures and criteria for selecting CIs and defines the process for their approval to a specified baseline	In Development	TBD
Naming CIs	SOP	Provides the procedures and criteria for naming CIs	In Development	TBD
Change Request Process	SOP	Provides the procedures to submit, evaluate, approve, and implement a change request.	In Development	TBD
Library Structure and access control	SOP	Provides the procedures and criteria for structuring the Library as well as controlling access to the Library	In Development	TBD
Placement of CI into storage	SOP	Provides the procedures and criteria for placing a CI into storage	In Development	TBD
Retrieval and reproduction of CIs from storage	SOP	Provides the procedures and criteria for retrieving reproducing CIs that have been stored in the CML	In Development	TBD
Creating a software build	SOP	Provides the procedures and criteria for creating a software build	In Development	TBD

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Title	Type	Description	Status	Location
Release of CI for usage	SOP	Provides the procedures and criteria for releasing a CI for use	In Development	TBD
Release of CI to production	SOP	Provides the procedures and criteria for releasing a CI for software production	In Development	TBD
File check-in/check-out process	SOP	Provides the procedures for checking files in and out of a CM controlled environment	In Development	TBD
Creating and Maintaining the Strictly Managed Library	SOP	Provides the procedures for creating and maintaining the Strictly Managed Library and the items under strict CM control	In Development	TBD
Creating and maintaining the Managed Library	SOP	Provides the procedures for creating and maintaining the Managed Library and the items under managed CM control	In Development	TBD
Archiving and purging CIs	SOP	Provides the procedures for archiving CIs and/or purging CIs from the CML	In Development	TBD
Creating and maintaining the VDD	SOP	Provides the procedures for creating and maintaining the VDD	In Development	TBD
Creating a baseline tracking log	SOP	Provides the procedures to create a baseline tracking log	In Development	TBD
Creating and maintaining baselines	SOP	Provides the procedures to create and maintain a baseline	In Development	TBD
Creating and Maintaining Action Items	SOP	Provides the procedures to create and maintain an Action Item	In Development	TBD
Preparing CSA reports	SOP	Provides the procedures for preparing CSA reports	In Development	TBD

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Title	Type	Description	Status	Location
Conducting Audits	SOP	Provides the procedures for conducting audits	In Development	TBD
CM Audit Checklist: Functional Baseline Audit	Checklist	Checklist for conducting the Functional Baseline Audit	In Development	TBD
CM Audit Checklist: Allocated Baseline Audit	Checklist	Checklist for conducting the Allocated Baseline Audit	In Development	TBD
CM Audit Checklist: Functional Configuration Audit (FCA)	Checklist	Checklist for conducting the FCA	In Development	TBD
CM Audit Checklist: Physical Configuration Audit (PCA)	Checklist	Checklist for conducting the PCA	In Development	TBD
Version Description Document (VDD)	Template	Template for the VDD	In Development	
ERA CCB Meeting Agenda Template	Template	Provides the CCB Meeting Agenda Template	In Development	TBD
ERA CCB Meeting Minutes Template	Template	Provides the ERA CCB Meeting Agenda Template	In Development	TBD
ERA CR Form	Form	Standard ERA CR form	In Development	TBD
ERA CP Form	Form	Standard ERA CP form	In Development	TBD
ERA CR Form Instructions	Form Instructions	Provides the instructions for creating and updating the ERA CR form	In Development	TBD
ERA CP Form Instructions	Form Instructions	Provides the instructions for creating and updating the ERA CP form	In Development	TBD

Table 5-1: CM Organizational Products**5.2 Configuration Management (CM) Tools**

A list of tools identified to support CM activities is provided below.

- PVCS – Version Manager
- ERA CR Tracking System
- ERA Action Item Database
- Rational ClearCase LT
- Rational ClearQuest

Details of each tool, its functionality, and the CM activities that it is intended to support are provided in the paragraphs below.

5.2.1 PVCS – Version Manager

PVCS is currently implemented within the ERA environment as the CM library repository for all configuration items and work products that are placed under CM control. PVCS provides access for all authorized users to check-in and check-out items for use. PVCS also provides version control capability to manage the versioning of changed files. PVCS provides basic reporting capability. PVCS generates a History Report, which provides a summary of information about archives and revisions made to an item stored within PVCS. The following options are available when generating a History Report in PVCS:

- All of the versioned files of all of the projects/subprojects within the project database or project
- Only the versioned files within the selected project, not including the projects and/or subprojects

For additional information on procedures for PVCS, refer to the *Configuration Management PVCS Procedures (CPP)* document.

A description of PVCS Version Manager and its functionality and CM activities that it supports is provided in **Table 5-2** below.

Software	Version	Functionality	Status of Implementation	Vendor
Polytron Version Control System (PVCS) – Version Manager	7.5.1 (Client)	<ul style="list-style-type: none"> • CML Repository • Workspace Management and Version Control 	Existing	PVCS
CM Activities				

Software	Version	Functionality	Status of Implementation	Vendor
		Configuration Identification: <ul style="list-style-type: none"> • CI identification, Maintain CI list, Establish ERA baselines, Create software builds, CI check-in/check-out, CI version control Configuration Status Accounting: <ul style="list-style-type: none"> • Collect CSA information, Prepare CSA reports, Collect CM metrics, Prepare CM metrics reports 		

Table 5-2: PVCS – Version Manager

5.2.2 ERA Change Request Tracking System

The primary function of the Change Request Tracking System (CRTS) is to record and track the status of change requests and change proposals. The CRTS also provides basic reporting capability as listed below. The CRTS is currently implemented within the ERA environment and is managed as a configuration item within PVCS. Change requests to CRTS are performed in accordance with the Change Request process as identified in **Section 3.2**. Instructions on the operation and use of the CRTS and instructions for creating, updating, and approving change requests and change proposals is provided in the Change Request Database User Guide (CUG).

Currently, a manual report is created to track change request and change proposal information including, change request control number, requestor, request date, approval date, priority, request status, approver, and document title.

A description of the CRTS and its functionality and CM activities that it supports is provided in **Table 5-3** below.

Software	Version	Functionality	Status of Implementation	Vendor
ERA CR Tracking System (Microsoft Access 2000 Database)	Version 1.0 Dated: 6/15/2004	<ul style="list-style-type: none"> • Change Request Management • Status Reporting 	Existing	ERA PMO locally developed
	CM Activities			
	Configuration Control: <ul style="list-style-type: none"> • Manage changes, Change Requests, and Change Proposals, change request tracking Configuration Status Accounting: <ul style="list-style-type: none"> • Collect CSA information, Prepare CSA reports, Collect CM metrics, Prepare CM metrics reports 			

Table 5-3: ERA Change Request Tracking System

5.2.3 Action Item Database

The Action Item Database is used to record and track action items as they occur for various activities throughout the ERA life cycle, such as change request implementation, meeting action items, etc. The Action Item Database is currently implemented within the ERA environment and is managed as a configuration item within PVCS. Change requests to the Action Item Database are performed in accordance with the Change Request process as identified in **Section 3.2**. The data elements collected for each action item include;

- Action Item Identifier
- Updated Date
- Location
- Severity (Critical, High, Intermediate, Low)
- Creation Date
- Action Required
- Assigned To
- Date Assigned
- Due Date
- Requested By
- Current Status (Open, Closed)
- Status Description
- Completion Date
- Status History

Currently, Action Item metric reports are manually generated from an Excel spreadsheet to track Action Item information including, action item control number, assigned to, assigned date, due date, completion date, severity, status description, and lessons learned entered.

A description of the Action Item Database and its functionality and CM activities that it supports is provided in **Table 5-4** below.

Software	Version	Functionality	Status of Implementation	Vendor
ERA Action Item Database (Microsoft Access 2000 Database)	Version 1.0 Dated: 6/15/2004	<ul style="list-style-type: none"> • CR Management • Status Reporting 	Existing	ERA PMO locally developed
	CM Activities			
	<ul style="list-style-type: none"> • Action Item Reporting and Tracking 			

Table 5-4: Action Item Database

5.2.4 Rational ClearCase LT

Rational ClearCase LT has been selected for the ERA program to be the official CM tool. The ERA Rational Planning Board, composed of a diverse group of users and stakeholders for the Rational toolset, are currently planning the implementation of ClearCase, ClearQuest, and other Rational tools to be implemented in the ERA environment. ClearCase is scheduled to be operational within the ERA environment by contract award. ClearCase will provide multiple CM functionality and will be tightly integrated with ClearQuest. (see **Section 5.2.5**) The integration of ClearCase and ClearQuest will extend change request management capabilities by providing linkage from change requests submitted through ClearQuest back to the configuration items as maintained and controlled within ClearCase. ClearCase itself will be managed as a configuration item. ClearCase configuration and documentation will be maintained within ClearCase and baselined. Changes to the configuration of ClearCase, including all patches, releases, and updates to the software will be initiated through the change request process as identified in **Section 3.2**.

A description of Rational ClearCase and the intended functionality and CM activities that it will support is provided in **Table 5-5** below.

Software	Version	Functionality	Status of Implementation	Vendor	
Rational ClearCase LT	2002.05.20	<ul style="list-style-type: none"> • CM Library Repository • Workspace Management and Version Control • Branch Management and File Merging • Baseline Generation • Build Management • Release Management 	Planned	IBM	
		CM Activities			
		Configuration Identification: <ul style="list-style-type: none"> • CI identification, Maintain CI list, Establish ERA baselines, Create software builds, CI check-in/check-out, CI version control Configuration Status Accounting: <ul style="list-style-type: none"> • Collect CSA information, Prepare CSA reports, Collect CM metrics, Prepare CM metrics reports 			

Table 5-5: Rational ClearCase LT

5.2.5 Rational ClearQuest

Rational ClearQuest will be implemented for the ERA program to manage changes, change requests, and change proposals and to track their status. ClearQuest is also in the planning phase and is expected to be implemented within the ERA environment by contract award. As

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discussed above ClearQuest will be configured to be integrated with ClearCase to provide extended change request management. ClearQuest will be managed as a configuration item and its configuration will be documented and controlled within ClearCase. Changes to ClearQuest's configuration will be initiated through the change request process as identified in **Section 3.2**.

A description of Rational ClearQuest and the intended change request management functionality that it will support is provided in **Table 5-6** below.

Software	Version	Functionality	Status of Implementation	Vendor	
Rational ClearQuest	2002.05.20	<ul style="list-style-type: none"> Change Request Management Defect Reporting and Tracking Enhancement Requests Status Reporting 	Planned	IBM	
		CM Activities			
		Configuration Control: <ul style="list-style-type: none"> Manage changes, Change Requests, and Change Proposals, Action Item tracking, change request tracking, defect reporting Configuration Status Accounting: <ul style="list-style-type: none"> Collect CSA information, Prepare CSA reports, Collect CM metrics, Prepare CM metrics reports 			

Table 5-6: Rational ClearQuest

5.3 Configuration Management (CM) Support Environment

Currently, the CM support environment is maintained within the National Archives Records Administration (NARA) network as illustrated in **Figure 5.1** below. The NARA server has a partitioned area on the S Drive that is reserved for the ERA program. The various CM databases currently reside within this partitioned space on the NARA server, e.g. the Action Item Database, the Change Request Tracking System, and the PVCS Repository. Security, maintenance, and access control of the NARA server is performed by the NARA IT staff. Additionally, security, maintenance, including backup and recovery of data, and access control for CM databases and website is maintained by the ERA staff. An additional layer of access control is applied to each of the CM databases and managed by the ERA staff. A separate NARA web server is used to host the ERA Website, which maintains the CCB web pages. Maintenance, update, and backup of the ERA Website are performed by the ERA staff. As discussed in **Section 5.2**, configuration management is applied to the databases and the ERA Website to ensure that the configuration of the tools and website is documented and controlled.

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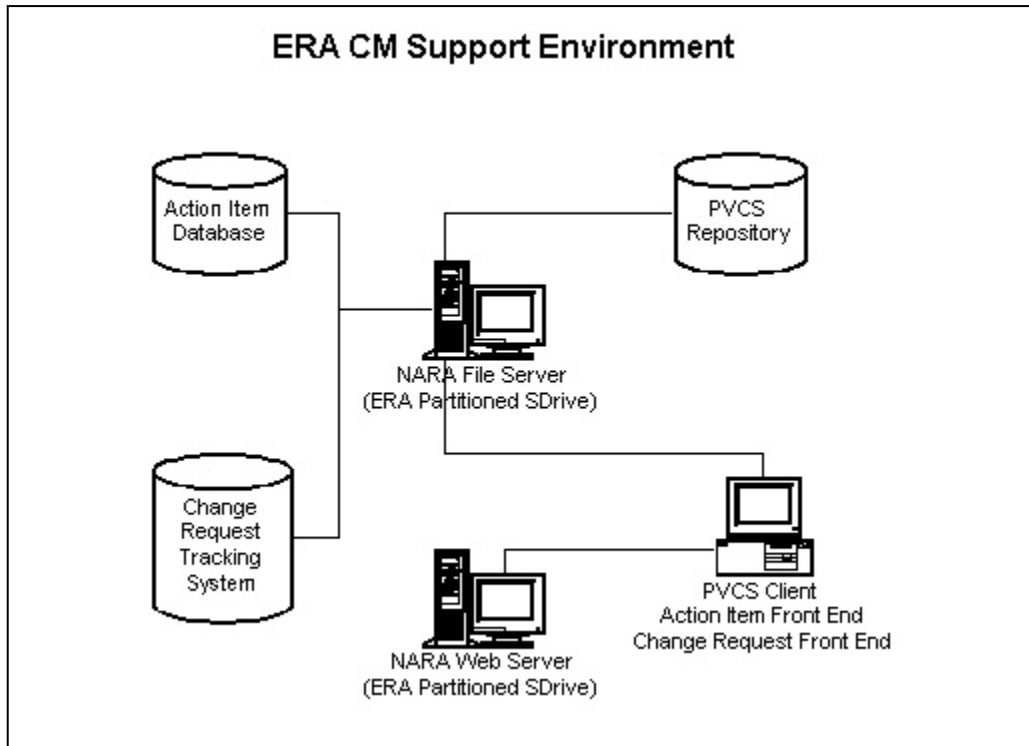


Figure 5-1: ERA CM Support Environment

5.4 Configuration Management (CM) Personnel

The ERA PMO CM Team consists of representatives in each of the following roles:

- CM Specialist,
- CM Librarian,
- CM Integrator, and
- Software Tools Specialist.

Descriptions and functions for ERA PMO personnel identified for providing support for various CM activities are provided in **Table 5-7, ERA CM Personnel**. The number of CM team members will be identified from CM work packages as they are developed from additional details added to the WBS.

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CM Position	Description	Functions	Staff Member
CM Specialist	The CM manager is responsible for the overall CM program. The CM manager develops policy and guidelines and plans CM activities, schedules, and resources. The CM manager establishes the CM environment, including CM personnel, tools, equipment and other work products required to perform CM activities. The CM manager also supports the CCB, manages the change request process, and processes and tracks change requests.	<ul style="list-style-type: none"> • Plans CM activities, schedules, and resources • Develops and updates CM Guide • Develops and updates CM Plan • Develops CM Standard Operating Procedures (SOPs), checklists, forms, and templates • Establishes the CM environment • Identifies candidate components and work products as configuration items for configuration management • Reviews configuration status accounting reports and submits to management • Performs Configuration Audits • Participates in system reviews • Manages Changes, Change Requests, and Change Proposals • Participates in CCB and ERB meetings • Monitors CM processes and performs process improvement activities 	Carol Harris

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CM Position	Description	Functions	Staff Member
CM Librarian	The CM librarian is responsible for establishing the CM library and maintaining the integrity of the library and its contents. The CM librarian is also responsible for collecting configuration status accounting data and preparing reports.	<ul style="list-style-type: none"> • Establishes and maintains the CM Library • Establishes and maintains the CM library structure • Places configuration items and work products into the appropriate library • Records the data elements for each configuration item and work product maintained in the CM library • Extracts information and prepares status reports • Identifies CM records to be archived 	Carol Harris TBD
CM Integrator	The CM integrator is responsible for establishing CM baselines and managing releases. The CM integrator ensures that all identified configuration items are present for a build or release.	<ul style="list-style-type: none"> • Creates new component baselines • Builds the components of the system • Ensures that builds are tested • Promotes baselines • Releases baselines for production or use • Documents baselines and prepares release notes and Version Description Documents • Updates the Baseline Tracking Log 	Carol Harris TBD

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CM Position	Description	Functions	Staff Member
Software Tools Specialist	The Software Tools Specialist is responsible for installing and maintaining the CM tools, software, and databases for the ERA program. The Software Tools Specialist is also responsible for providing tool support to users. The Software Tools Specialist ensures the integrity of the environment by performing adequate backup and recovery of CM tools and data. Additionally, the Software Tools Specialist performs configuration management on all software and database configurations and manages software and database changes in accordance with Section 3.2 Change Control .	<ul style="list-style-type: none"> • Installs and configures CM tools, software, and databases • Maintains software; applies patches, releases, and updates • Documents software configuration and provides release information • Manages user access control • Supports users of CM tools • Develops user documentation and organizational products to document the procedures for the operation and administration of CM tools • Performs adequate backup and recovery of software, databases and data • Archives approved CM records • Monitors system performance and operation for improvement • Processes and formats extracts of contractor data 	TBD

Table 5-7: ERA CM Personnel

5.5 Configuration Management (CM) Training

Proper training is essential for CM personnel to efficiently accomplish their tasks. Training needs are determined by matching skill requirements for a specific task against the skills of the assigned personnel.

Specific training needs for support of CM activities for the ERA Program have been identified in **Table 5-8, CM Training Needs**, below. The list of training requirements is expected to change as development of the ERA program continues to expand.

Training	Type of Training	Description	Level	Vendor(s)	CM Position
Rational ClearCase User Training, Unified Change Management (UCM)	Classroom	Training on the use of Rational ClearCase in a Unified Configuration Management (UCM) environment to manage software development projects and configuration management activities.	Intermediate	IBM	CM Specialist, CM Librarian, CM Integrator
Essentials of CM with Rational ClearCase, UCM	Classroom	Introduction to the general concepts of Rational ClearCase Unified Configuration Management (UCM) to perform day-to-day software development and configuration management tasks, such as check-in, check-out, merging, and baselining.	Intermediate	IBM	CM Specialist

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Training	Type of Training	Description	Level	Vendor(s)	CM Position
Rational ClearCase Administration	Classroom	Advanced administration training for deploying and maintaining ClearCase from initial project planning through configuration, installation, and ongoing administration.	Advanced	IBM	Software Tools Specialist
Rational ClearQuest Administration	Classroom	Training on the administration and customization of Rational ClearQuest focusing on the planning and implementation of defect and change request tracking processes and the customization of ClearQuest to facilitate these operations.	Advanced	IBM	Software Tools Specialist, CM Specialist
ERA Rational ClearCase for Configuration Management , User Training	Classroom	User training on the ERA procedures for Configuration Management as implemented in ClearCase.	Basic	ERA provided	Various ERA PMO users

Training	Type of Training	Description	Level	Vendor(s)	CM Position
ERA Rational ClearQuest for Change Management	Classroom	User training on ERA procedures for Change Request management as implemented in ClearQuest.	Basic	ERA provided	Various ERA PMO users
Configuration Control Board Training	Brown Bag	Informational to introduce CCB members to an overview of the CCB, its intended purpose, and roles and responsibilities.	Basic	ERA provided	All CCB permanent members

Table 5-8: CM Training Needs

Additionally, training needs for the ERA PMO CM team have been identified and are discussed in the *ERA Training Needs Assessment (TRA)* document. Specific CM areas of training are identified in Appendix B, ERA PMO Training Needs Assessment Criteria Summary, Table II, Process Training (Configuration Management) of the TRA document. The CM Specialist will continue to work with the Communications Team to reassess and update the training needs assessment for configuration management personnel projected throughout the complete life cycle of the ERA program.

6.0 Configuration Management (CM) Plan Maintenance

The ERA CM Specialist is responsible for the development and maintenance of this plan. The CMP will continue to be updated as needed throughout the entire ERA life cycle to ensure the relevance and adequacy of the CMP to plan and manage CM activities. Scheduled updates to the CMP will follow project milestones as listed in **Table 6-1, Configuration Management Plan (CMP) Maintenance Schedule**, below. Following the initial approval of the CMP by the ERA PMO, the plan will be placed under CM control. Unscheduled updates to the CMP will be controlled by the CCB. (See **Section 3.2, Configuration Control** for discussion of the ERA change control process for CIs.)

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	Closing of Concept Need	Closing of Concept Exploration	Closing of Increment 1 (Requirements)	Closing of Increment 1 (Architectural Design)	Closing of Increment 1 (Detailed Design)	Closing of Increment 1 System Test	Closing of Increment 2 System Test	Closing of Increment 3 System Test	Closing of Increment 4 System Test	Closing of Increment 5 (System Test)	Final Acceptance
CMP	1.0	2.0	3.0	4.0	5.0	5.1	5.2	5.3	5.4	5.5	6.0
1.0 Intro	√										
2.0 CM Mgmt	√			√							√
3.0 CM Activities	√	√	√	√	√	√	√	√	√	√	√
3.1 Configuration Identification	√	√	√	√	√	√	√	√	√	√	√
3.2 Configuration Control	√	√	√	√	√						√
3.3 Configuration Status Accounting	√	√	√	√	√						√
3.4 Audits & Reviews	√	√	√		√	√	√	√	√		√
3.5 Interface Control	√		√	√		√	√	√	√		√
3.6 Subcontractor/ Vendor Control	√			√		√	√	√	√		√
4.0 CM Schedule	√	√	√	√	√	√	√	√	√	√	√
5.0 CM Resources	√		√		√	√	√	√	√		√
6.0 Plan Maintenance	√	√	√	√	√					√	√

Table 6-1: Configuration Management Plan (CMP) Maintenance Schedule

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APPENDIX A: IEEE Std. 828-1998 Document Tailoring

This document is based on a tailored version of IEEE Std. 828-1998. **Table A-1, IEEE to CMP Mapping**, details the mapping between 828-1998 and this CMP.

IEEE Std. 828-1998	ERA Configuration Management Plan (CMP)	Additions to requirements of IEEE Std 828-1998
4.1 Introduction	1.0 Introduction	
		1.1 Purpose
		1.2 ERA program overview
		1.3 Scope
		1.4 Assumptions
		1.5 Limitations
		1.6 Definitions and acronyms
		1.7 References
		1.7.1 ERA PMO documents
		1.7.2 NARA documents
		1.7.3 Standards and guidelines
4.1 SCM management	2.0 CM management	
4.2.1 SCM organization	2.1 CM organization	
4.2.2 SCM responsibilities	2.2 CM roles and responsibilities	
		2.3 Organizational entities versus responsibilities
4.2.3 Applicable policies, directives, and procedures	2.4 Applicable policies, standards, and procedures	
		2.4.1 ERA policies
		2.4.2 ERA standards
		2.4.3 ERA PMO procedures
4.3 SCM activities	3.0 CM activities	
4.3.1 Configuration identification	3.1 Configuration identification	
4.3.1.1 Identifying configuration items	3.1.1 Identifying configuration items	
4.3.1.2 Naming configuration items	3.1.2 Naming configuration items	

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IEEE Std. 828-1998	ERA Configuration Management Plan (CMP)	Additions to requirements of IEEE Std 828-1998
4.3.1.3 Acquiring configuration items	3.1.3 Acquiring configuration items	
4.3.2 Configuration control	3.2 Configuration control	
4.3.2.1 Requesting changes	3.2.1 Requesting changes	
4.3.2.2 Evaluating changes	3.2.2 Evaluating changes	
4.3.2.3 Approving or disapproving changes	3.2.3 Approving or disapproving changes	
4.3.2.4 Implementing changes	3.2.4 Implementing changes	
		3.2.5 Emergency Change Requests
		3.2.6 Change Request State Descriptions
4.3.3 Configuration status accounting	3.3 Configuration status accounting	
		3.3.1 Configuration items reporting
		3.3.2 Change request reporting
		3.3.3 System build and release reports
		3.3.4 Audit reports
		3.3.5 CM Metrics reports
		3.3.6 Configuration status accounting reporting frequency
		3.3.7 Configuration status accounting reporting and collection
4.3.4 Configuration audits and reviews	3.4 Configuration audits and reviews	
		3.4.1 Configuration audits
		3.4.2 Reviews
4.3.5 Interface control	3.5 Interface control	
4.3.6 Subcontractor/vendor control	3.6 Subcontractor/vendor control	
		3.6.1 Subcontractor products
		3.6.2 Vendor products

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IEEE Std. 828-1998		ERA Configuration Management Plan (CMP)		Additions to requirements of IEEE Std 828-1998
4.4	SCM schedules	4.0	CM schedules	
				4.1 General CM activities schedule
				4.2 CM records management schedule
4.5	SCM resources	5.0	CM resources	
				5.1 CM organizational products
				5.2 CM tools
				5.2.1 PVCS – version manager
				5.2.2 ERA change request tracking system
				5.2.3 Action item database
				5.2.4 Rational ClearCase LT
				5.2.5 Rational ClearQuest
				5.3 CM support environment
				5.4 CM personnel
				5.5 CM training
4.6	SCM plan maintenance	6.0	CM plan maintenance	
				Appendix A: IEEE Std 828-1998 Tailoring of the CMP
				Appendix B: Sample CI list
				Appendix C: Configuration item types and subtypes
				Appendix D: ERA change request process flow diagram

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APPENDIX B: ERA Configuration Items List (Sample List)

Table B-1, Sample Configuration Item List, provides a sample list of candidate CIs. This list is provided as guidance for the selection and approval of CIs and specifies work product, type and subtype, applicable baseline, Level of CM control, and version number.

Account Category	CI Name	CI Type	CI Subtype	V #	CM Control	Baseline
Acquisition	Acquisition Strategy	DC	AS	3.0	Strict	Concept
	Contractor Coordination Plan	DC	CCP	1.0	Strict	
	Contractor Oversight and Tracking Plan	DC	COTP	1.1	Strict	
	Contract, Task Order, SOW	DC			Strict	Functional
	Downselect Plan	DC	DP		Strict	
	Feature List	DC	FL	1.0	Strict	
	Introduction to Policies, Templates, and Requirements Concepts	DC	TEMP	1.0	Strict	
	Introduction to Preservation and Access Levels Concepts	DC	PAL	1.0	Strict	
	Legacy System Transition Plan	DC	LTP	1.1	Strict	
	Market Research Report	DC	MRR	2.0	Strict	Concept
	Source Selection Authority	DC	SSA		Strict	
	Source Selection Plan	DC	SLP	2.0	Strict	
	Source Selection Process	DC	SSE		Managed	
	Source Selection Tools	DC	SST		Managed	
	Target Release Paper	DC	TAR		Strict	Concept
Capital Planning	Analysis of Alternative	DC	AOA	2.0	Strict	Concept
	Business Case Analysis	DC	BCA	2.0	Strict	Concept

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Account Category	CI Name	CI Type	CI Subtype	V #	CM Control	Baseline
	Cost Analysis Assumption Document	DC	CAAD	1.0	Strict	
	Estimating Guide	DC	ES		Strict	
	Estimation Process	DC	EP		Strict	
	Load Analysis Report	DC	LAR	1.0	Strict	Concept
Communications	Organizational Change Management Plan	DC	CHM	1.1	Strict	
	Communications Management Plan	DC	COM		Strict	
	Communications Plan	DC	CP	2.0	Strict	
Configuration Management	Configuration Management Plan	DC	CMP	2.0	Strict	
	Configuration Management Guide	DC	CMG	1.0	Strict	
	CCB Meeting Agendas	DEL		MMD DYY YY	Managed	
	CCB Meeting Minutes	DEL		MMD DYY YY	Managed	
	CCB Action Items	DEL		MMD DYY YY	Managed	
Metrics	Metrics Plan	DC	MP	2.0	Strict	
	Metrics Report Process	DC	MRP	1.0	Strict	
	Metrics Reports (Monthly)	DC	MR	MMY Y	Managed	
	Monthly Status Report	DC	MSR	MMY Y	Managed	
	Performance Goals Specifications	DC	PGS	1.0	Managed	
Program Management	File Plan	DC	FP		Strict	

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Account Category	CI Name	CI Type	CI Subtype	V #	CM Control	Baseline
	Program Management Plan	DC	PMP	1.2	Strict	
	Task Order Management Plan	DC	TOMP	2.0	Strict	
Quality Management	Document Development and Approval Process	DC	DAP	2.0	Managed	
	Peer Review Process	DC	PRP	1.1	Managed	
	Quality Management Guidance	DC	QMG	1.1	Strict	
	Quality Management Plan	DC	QMP	2.2	Strict	
	Technical Review Process	DC	TEP	1.0	Strict	
Requirements	Concepts of Operations	DC	COP	3.0	Strict	Concept
	Design and Deployment Concepts Paper	DC	DDC	2.0	Strict	
	ERA Life Cycle	DC	ELC	2.1	Strict	Concept
	External Interface Requirements Document	DC	IRD		Strict	Concept
	Facilities Requirements Assessment	DC	FRA	1.0	Strict	
	Mission Needs Statement	DC	MNS	1.2	Strict	Concept
	Requirement Management Guide	DC	RQG	1.0	Strict	
	Requirement Management Plan	DC	RQM	2.1	Strict	
	Requirements Document	DEL	RD	3.0	Strict	Concept
	Requirements Traceability Matrix	DEL	RTM		Strict	Functional

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Account Category	CI Name	CI Type	CI Subtype	V #	CM Control	Baseline
	Use Case Document	DEL	UCD	1.0	Strict	Concept
	Vision Statement	DC	VS	1.0	Strict	Concept
Research	ERA Research Plan	DC	ERP	2.1	Strict	
Risk	Assessment Final Report Year 2	DEL	AFRY2	1.0	Managed	
	Risk Management Guide	DC	RKG	1.0	Strict	
	Risk Management Plan	DC	RKM	2.3	Strict	
	Task 4.1 Initial Assessment	DEL		1.2	Managed	
Security	Privacy Impact Assessment	DEL	PIA	2.3	Managed	
	Security Test and Evaluation Plan	DC	STEP		Strict	
	System Security Plan	DC	SSP	2.0	Strict	
Testing	Testing Management Guide	DC	TMG	1.2	Strict	
	Testing Management Plan	DC	TSP	2.1	Strict	
Training	PMO Training Plan	DC	TRP	1.0	Strict	
	Training Needs Assessment	DEL	TRA	2.1	Managed	
IVVP	Independent Verification and Validation Plan	DC	IVVP	1.1	Strict	
	Independent Verification and Validation Reports	DEL	IVVR		Managed	
Development Contractor	COTS products	DEL			Strict	Product
	Data Dictionary	DEL	DD		Strict	Product
	System Architecture and Design Specification	DC	SARAD		Strict	Allocated

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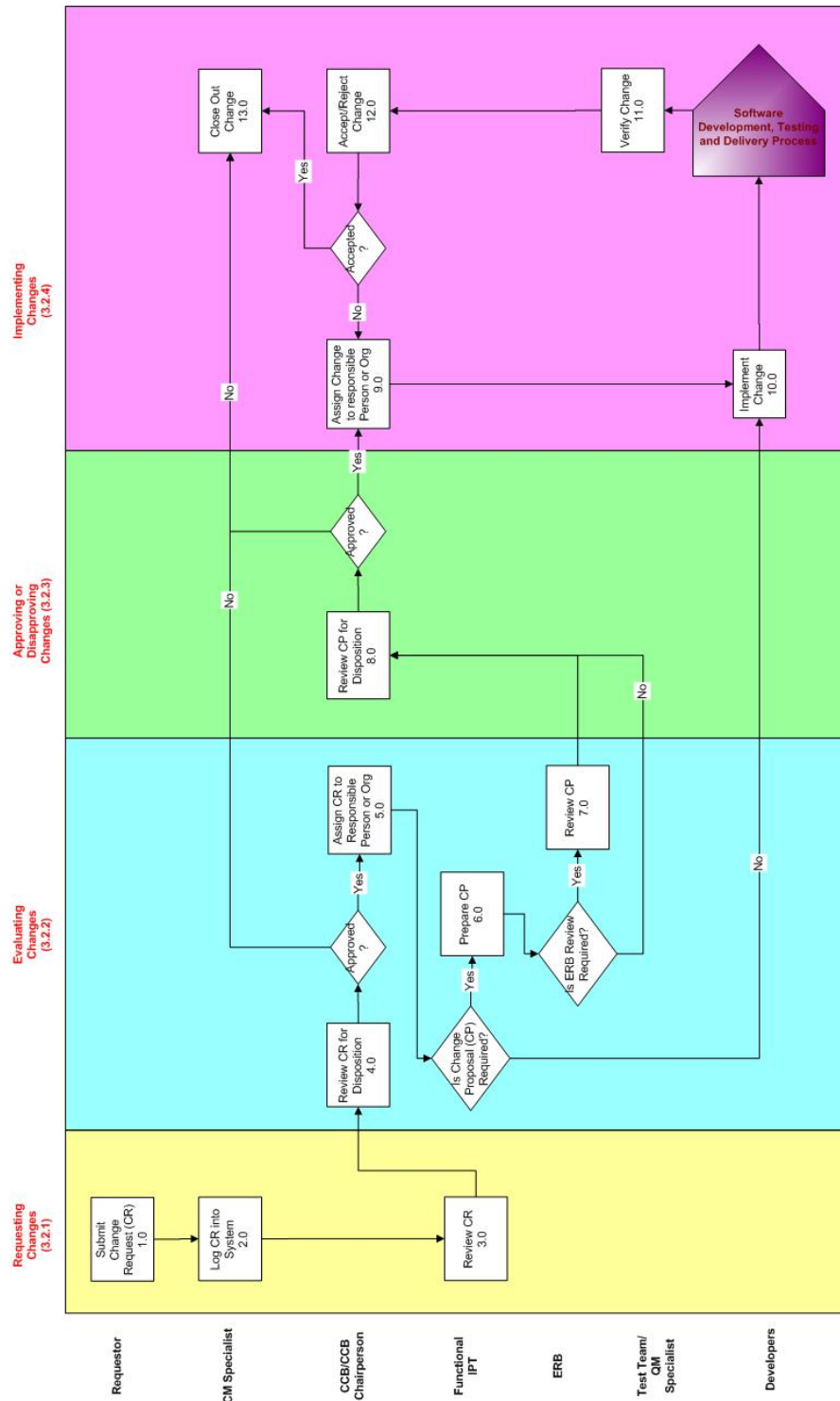
Account Category	CI Name	CI Type	CI Subtype	V #	CM Control	Baseline
	Interface Design Document	DC	IDD		Strict	Allocated
	Software Code				Strict	Production/Product
	Compiler				Strict	Production/Product
	Test Cases and Procedures	DEL			Strict	Production/Product
	Test Report	DEL			Managed	
	Acceptance Test Plan	DC			Strict	Product
	Acceptance Test Report	DEL			Strict	Product
	Release Notes	DEL			Strict	Production/Product
	Version Description Document	DEL			Strict	Production/Product
	System Development Plan	DC			Strict	
	Configuration Management Plan	DC			Strict	
	Quality Assurance Plan	DC			Strict	
	Risk Management Plan	DC			Strict	
	System Security Plan	DC			Strict	
	Certification and Accreditation (C&A) Plan	DC			Strict	
	Continuity of Operations Plan	DC			Strict	
	Facilities Plan	DC			Strict	
	Operations and Support Plan	DC			Strict	
	Training Documentation	DC			Strict	Product
	User Documentation	DC			Strict	Product

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Account Category	CI Name	CI Type	CI Subtype	V #	CM Control	Baseline
	Operations/Maintenance Documentation	DC			Strict	Product
	Configuration Management Data (archive file)	DEL			Strict	Product
	Training Plan	DC			Strict	
	QA Audits	DEL			Managed	
	QA Reviews	DEL			Managed	

APPENDIX C: ERA Change Request Process Flowchart

Figure C-1, ERA CR Process Flowchart, provides a visual representation of the CR process flow.



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APPENDIX D: Configuration Item (CI) Types and Subtypes

Table D-1, Configuration Item (CI) Types and Subtypes, provides a comprehensive list of CI types and subtypes.

CI Type	CI Subtype (Components)	Description
HW	SVR	Servers
	LIC	Licensing information
	PLA	Platform configuration items
SW	WBS	Web Server
	DBS	Database Server
	APS	Application Server
	SPS	Support Server
	CWS	Client Workstation
	INS	Installation Scripts
CO	WBS	Web Server
	DBS	Database Server
	APS	Application Server
	SPS	Support Server
DB	DBS	Database Management System
	DAT	Data files
	BCK	Backup files