ATTACHMENT 16 – INTEGRATED PLAN

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THE ELECTRONIC RECORDS ARCHIVE (ERA) BUSINESS INFORMATION FRAMEWORK

The Integrated Plan is one of the six management plan documents that comprise the ERA business information framework. The framework, shown in Figure 16–1, ERA Business Information Framework, provides the means for guiding and controlling work within the ERA program.

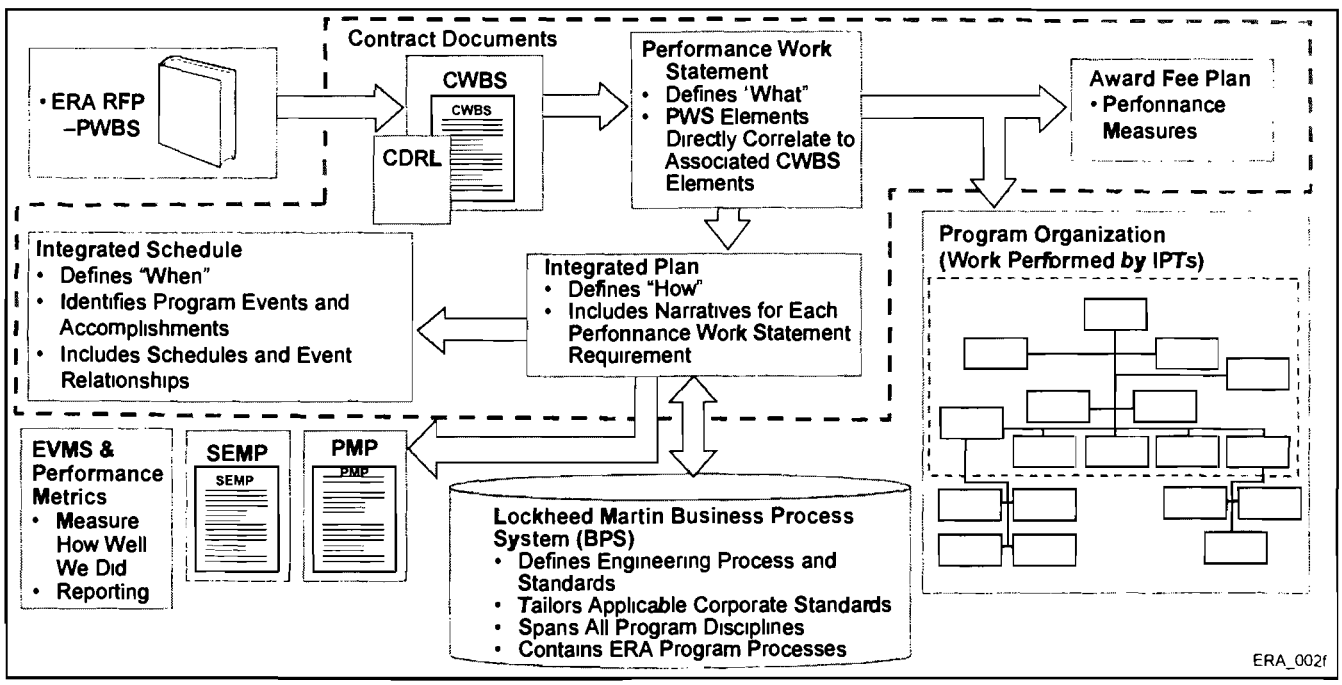


Figure 16–1. ERA Business Information Framework

The contents of the management plan documentation is driven by the requirements and information found within the ERA Request for Proposal (RFP). For example, the Contract Work Breakdown Structure (CWBS) is derived from the NARA Performance Work Breakdown Structure (PWBS), and the Contract Data Requirements List (CDRL) has enhanced the ERA RFP's CDRL with additional Lockheed Martin Team delivery recommendations. The Performance Work Statement (PWS) explains 'what' work will be performed, as organized by the CWBS work structure, while the Award Fee Plan describes how Lockheed Martin Team performance will be rewarded. The Integrated Plan explains 'how' the work described in the PWS will be performed, and the Integrated Schedule describes 'when' the work will be performed. The management plan documentation is further described in the following list. Please refer to the individual documents for detailed information. ERA management plans include:

- **Contract Work Breakdown Structure (CWBS).** The CWBS defines the scope of the effort and how the team will accumulate costs. The CWBS aligns responsibility with accountability within the team's organization and establishes the single numbering system that serves as the thread for the overall business information framework. The PWS, the Integrated Plan and the Integrated Schedule all use the numbering system documented within the CWBS.

- Contract Data Requirements List (CDRL). The CDRL defines the data to be delivered to NARA. For the ERA program, data may be defined as software, hardware, documentation, or formal program reviews. The Lockheed Martin Team has enhanced the original NARA CDRL with recommendations for additional data items.
- Performance Work Statement (PWS). The PWS describes the specific work required to produce the products and services associated with the System Analysis and Design phase, Implementation phase and the Operations and Support phase. It describes the required services to be rendered, their related tasks and any associated CDRL items.
- Integrated Plan. The Integrated Plan consists of two principal parts: the event tables that define what will be achieved (i.e., the program events, significant accomplishments, and accomplishment criteria) and the process narratives that say how the Lockheed Martin Team will perform the effort to satisfy the program events, significant accomplishments, and accomplishment criteria. Through the definition of the program events, the Integrated Plan defines the capabilities that will be provided with each increment. The System Engineering Management Plan (SEMP) is developed from the Integrated Plan and becomes the governing Engineering Management Plan for program execution. All engineering processes map into the SEMP. The Program Management Plan (PMP) defines the organizational structure, roles, and responsibilities that execute the processes captured within the Integrated Plan.
- Integrated Schedule. The Integrated Schedule shows the dates and network relationships for the program events, significant accomplishments, and accomplishment criteria defined in the Integrated Plan. The Lockheed Martin Team updates the Integrated Schedule regularly to show the status and progress toward achieving the program events, significant accomplishments, and accomplishment criteria.
- Award Fee Plan. The Award Fee Plan uses performance measures to assess the Lockheed Martin Team performance. The measures are regularly re-evaluated and adjusted by NARA in conjunction with the Lockheed Martin Program Management Team.

OVERVIEW

The ERA Integrated Plan is the Lockheed Martin ERA Team's single authoritative program-level plan from which all other plans and schedules are derived and managed. The Integrated Plan describes the Program Events, Significant Accomplishments, Accomplishment Criteria, and processes that will transform NARA's requirements, business rules, mission, and vision, and the Lockheed Martin Team's hardware- and software-independent solutions and management practices into a fully compliant, integrated, accessible, and highly evolvable ERA system.

Managing to an Integrated Plan is defined as a best practice within Lockheed Martin and is used in a large majority of its commercial, government, and defense programs world-wide. For the ERA program, the Lockheed Martin Team has defined, developed, and refined a uniquely tailored ERA Integrated Plan that ensures the program has a structured framework that will allow us to start quickly and efficiently to successfully execute during the implementation phase of the program, and accomplish our shared objectives, all while meeting our schedule and cost commitments at the lowest possible risk. The process framework and numbering scheme we utilize is comprised of distinctly defined and described processes for the entire ERA system development, deployment, and operations lifecycle:

- **1000** Program Administration – Performs overall administration and control.

- **2000** Architecture and Evolution Development – Defines and plans the overall evolution of the ERA product.
- **3000** Overall Systems Engineering, Integration, and Testing – Defines and ensures compliance with standard engineering and design processes and controls.
- **4000** ERA Solution Development – Development and design of the ERA products for Ingest, Storage, Dissemination, ERA Management, Local Services, and Control Services.
- **5000** Deployment – Deployment of the ERA system, subsystems.
- **6000** Operations & Maintenance – Control and maintenance of the deployed system.

The use of a baseline process framework as described in the Integrated Plan ensures that all Lockheed Martin Team employees and subcontractors use a common set of processes and procedures at every stage of the program. The Integrated Plan provides all team members a clear understanding of the Program Events, Significant Accomplishments, and Accomplishment Criteria for which the Lockheed Martin Team will be held accountable. It provides a clear means to understand and status progress against major program objectives over the life of the ERA Program. The comprehensive level of detail in our Integrated Plan was specifically structured to meet these objectives.

The ERA Integrated Plan is structured into two major sections: the ERA Activity Description and the Integrated Plan Narratives.

ERA Activity Description

The first part of the Integrated Plan further defines the "what" established by the PWBS, CWBS, and PWS by establishing specific program events (milestones) and measurements (accomplishments and criteria) for determining successful achievement in meeting the ERA development, delivery, and sustainment requirements. The ERA Integrated Plan Event Activity report provides the detail of significant and relevant events and measurements and provides a matrix for correlation to the other program documents. The Integrated Plan events, accomplishments, and criteria are also correlated, in the Event Activity Report, to the program Integrated Product Teams (IPTs) that will be accountable for execution of specific tasks.

Integrated Plan Narratives

The second part of the Integrated Plan provides high level narrative descriptions of key processes we will implement to accomplish the tasks, events, and measurements in meeting the objectives of the program. The process baseline is captured and controlled through the Business Process System (BPS) which is the Lockheed Martin Team's official process asset repository (library) for the ERA program. Included in the introduction to the narrative section is a description of the ERA Integrated Process and Execution Framework (IPEF), with an explanation of how the results of each of the individual processes are used to support the overall management of the ERA program.

Once the activities are defined and linked in the Integrated Plan, the detailed tasks and schedules for completion of Program Events, Significant Accomplishments, and Accomplishment Criteria are then baselined, tracked, managed, and reported through the time-phased ERA Integrated

Schedule. The Earned Value Management System (EVMS) is used by the Lockheed Martin Team to status and measure our planned vs. actual cost and schedule performance the results of which, are reported at regularly scheduled program reviews.

Single Numbering Scheme

To establish the linkage and traceability of the Integrated Plan to the CWBS, PWS, and Integrated Schedule, a single numbering scheme is employed Figure 16–2, The ERA Activity Report, that provides an integrated, event-based common code enabling a common reference point regardless of which document is being utilized. Figure 16–2 describes the single-numbering coding scheme and other critical information provided as part of the ERA Integrated Plan Event Activity Report.

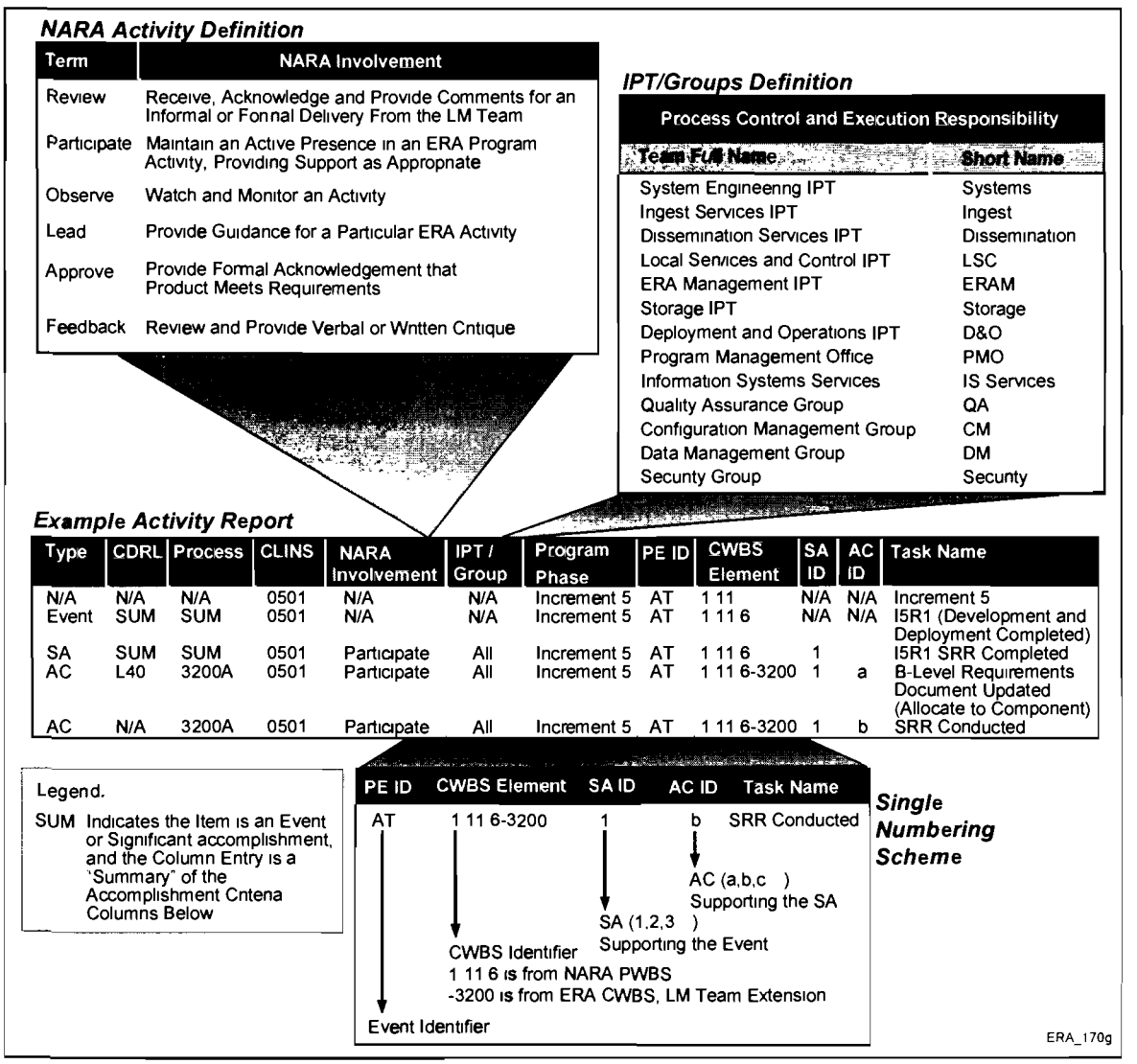


Figure 16–2. The ERA Activity Report

Integrated Plan Activity Closure Definitions

Similar to a single numbering scheme, activity definitions are critical to establishing a common understanding and expectation of what is to occur for each activity whether in the CWBS, PWS, Integrated Plan, or Integrated Schedule. Table 16–1, Activity Closure Definitions, shows the accomplishment definitions we use for activities in the Integrated Schedule.

Table 16–1. Activity Closure Definitions

Common terms defined and used in the Integrated Plan & Integrated Schedule tables provide a basis for objective closure and mutual understanding of significant accomplishments and accomplishment criteria.

Integrated Plan/Integrated Schedule Definition of Terms for IPT Approval/Closure	
Allocated	Subject parameter or requirement has been subdivided or apportioned into the applicable next lower level and assigned in the appropriate process or documentation
Analyzed	Subject parameter has been technically evaluated through equations, simulations, charts, or reduced data
Approved	Subject configuration item, data document, process, or procedure has been submitted to and approved by designated approving entity and the approving body has notified the originating party that it is acceptable with or without comments
Available	Subject item is in place or subject process is operational & accessible for use through online working folders or Team Portal
Baselined	Subject item is of sufficient maturity to place under configuration/revision control and represents a point of departure
Closed	Response satisfies the action requested with concurrence by originator
Completed	Subject item has been prepared according to governing documentation and has been accepted by the responsible IPT for use or evaluation by next users
Conducted	Review has been performed to document the maturity level of a document, analysis, or design
Defined	Subject item has been described in the appropriate description document and is available for use by the program
Delivered	Subject configuration item, data, or document has been accepted by the appropriate user
Demonstrated	Subject item has been shown to be in accordance with the contract or other specified requirements through performance and quantifiable measurement, where success or failure is determined by observation
Developed	Subject item has been produced following an approved process
Established	Subject item has been created and set in place in a manner consistent with its intended use (e.g., procedure baselines established) after review and acceptance by the IPT or responsible team
Finalized	Subject item is complete with no TBDs, has been approved by the Change Control authority, and is under configuration/revision control
Identified	Characteristics of a configuration item, process, or function have been made known

Integrated Plan/Integrated Schedule Defmition of Terms for IPT Approval/Closure	
Implemented	Subject policy, approach, or procedure is in execution
Integrated	Subject has been consolidated into an entity by appropriately combining separate elements (e.g., requirements, data, hardware)
Refined	Subject item, process, data, or document has been improved from a previous use
Released	Subject data or document has received contractor approvals and is available for use online
Reviewed	Subject data, document, or process has been examined and critiqued against the subject criteria
Updated	Subject item, process, data, or document has been reevaluated using later information, adjustments have been incorporated and is available for use online

The ERA Activity Description

Our Integrated Plan is an event-based plan that uses a hierarchical structure to incrementally define the most important activities associated with completing major milestones towards meeting ERA program requirements. Program Events (PEs) represent the culmination of these activities. Table 16–2, ERA Program Events, presents the 24 Program Events that have been defined for the ERA program. Each event was selected, structured, and sequenced to facilitate top-level NARA and Lockheed Martin Team management, insight, and control of the ERA program. Program Events are achieved when all of their associated Significant Accomplishments and associated Accomplishment Criteria, as detailed in the ERA Integrated Schedule, are completed.

Table 16–2. ERA Program Events

Event ID	Program Events	Phase	Description
AA	Contract Awarded	Analysis and Design	Formal notification that the LM Team has been authorized to begin work on the ERA Program, Analysis and Design Phase.
AB	System Requirements Review (SRR) Conducted	Analysis and Design	Defined in CDRL #2, and conducted during the Analysis and Design phase. It is a review to validate NARA requirements, derived requirements, and functional architecture. Successful completion of SRR results in approval of the allocation to a physical architecture, and establishes the basis for proceeding with preliminary design.
AC	System Design Review (SDR)	Analysis and Design	CDRL #4, conducted during the Analysis and Design phase. It is a review to ensure that allocated technical requirements have been optimized, correlated, and completed. Successful completion of the SDR results in the approval of specifications, the definition of interfaces, and establishes the functional configuration baseline for proceeding with design.

Event ID	Program Events	Phase	Description
AD	Prototype Demonstration Conducted	Analysis and Design	The prototype demonstration is held prior to the end of the Analysis and Design phase and plays a deciding factor in the award of the contract for Increments 1 and beyond.
AE	Option 1 Downselect Awarded	Analysis and Design	Award of the contract for Option 1 (Increments 1 and beyond).
BA	Contract Awarded	Increment 1	Formal notification that the LM Team has been authorized to begin work on the ERA Program, Increment 1 phase.
BB	I1R1 (Development and Deployment) Completed	Increment 1	Completion of the development and deployment of the Increment 1 Release 1 (I1R1) ERA product.
BC	I1R2 (Development and Deployment) Completed	Increment 1	Completion of the development and deployment of the Increment 1 Release 2 (I1R2) ERA product.
BD	I1R3 (Development and Deployment) Completed	Increment 1	Completion of the development and deployment of the Increment 1 Release 3 (I1R3) ERA product.
BE	Initial Operational Capability (IOC) Completed	Increment 1	IOC is scheduled to occur at the end of Increment 1. All of the initial planned ERA functionality must be installed and successfully tested to claim completion of this event.
CA	Contract Awarded	Increment 2	Formal notification that the LM Team has been authorized to begin work on the ERA Program, Increment 2 phase.
CB	I2R1 (Development and Deployment) Completed	Increment 2	Completion of the development and deployment of the Increment 2 Release 1 (I2R1) ERA product.
CC	I2R2 (Development and Deployment) Completed	Increment 2	Completion of the development and deployment of the Increment 2 Release 2 (I2R2) ERA product.

Event ID	Program Events	Phase	Description
DA	Contract Awarded	Increment 3	Formal notification that the LM Team has been authorized to begin work on the ERA Program, Increment 3 phase.
DB	I3R1 (Development and Deployment) Completed	Increment 3	Completion of the development and deployment of the Increment 3 Release 1 (I3R1) ERA product.
DC	I3R2 (Development and Deployment) Completed	Increment 3	Completion of the development and deployment of the Increment 3 Release 1 (I3R1) ERA product.
EA	Contract Awarded	Increment 4	Formal notification that the LM Team has been authorized to begin work on the ERA Program, Increment 4 phase.
EB	I4R1 (Development and Deployment) Completed	Increment 4	Completion of the development and deployment of the Increment 4 Release 1 (I4R1) ERA product.
EC	14R2 (Development and Deployment) Completed	Increment 4	Completion of the development and deployment of the Increment 4 Release 2 (I4R2) ERA product.
FA	Contract Awarded	Increment 5	Formal notification that the LM Team has been authorized to begin work on the ERA Program, Increment 5 phase.
FB	15R1 (Development and Deployment) Completed	Increment 5	Completion of the development and deployment of the Increment 5 Release 1 (I5R1) ERA product.
FC	I5R2 (Development and Deployment) Completed	Increment 5	Completion of the development and deployment of the Increment 5 Release 2 (I51R2) ERA product.
FD	Final Operational Capability (FOC)	Increment 5	FOC is achieved when all ERA functions are in place, tested and operational.

Event ID	Program Events	Phase	Description
GA	Operation, Maintenance and Support Contract Awarded	Operations and Support	This event marks the award of the operations and support contract option.

Program Events are decomposed into Significant Accomplishments in the ERA Integrated Schedule. To provide a common traceability, each Significant Accomplishment is associated with a particular CWBS element through the event-based, single numbering scheme in the Integrated Schedule.

Significant Accomplishments are further decomposed into measurable Accomplishment Criteria, which represent the key steps required to complete the Significant Accomplishment. All IPT members participate in planning the completion of a Significant Accomplishment. It is also important to note that recommendations for NARA involvement in a particular task are also identified in the schedule.

In addition to the day-to-day scheduling and tracking completion of tasks in Microsoft Project, the ERA Integrated Schedule provides the means for tracking and correlating Program Events, Significant Accomplishments and Accomplishment Criteria, as well as the CDRLs, CLINS, CWBS Elements, Program Phases, IPTs, and the processes associated with each. These items are included in the ERA Integrated Plan Event Activity Report as Attachment A of this Integrated Plan. The activity report can also be accessed, through the Team Portal.

Program Events and the ERA Lifecycle

Program Events have been scheduled to occur throughout the ERA lifecycle, as shown in Figure 16–3, ERA Events Mapped to Lifecycle Phases. Each event represents a major accomplishment for the program, bringing NARA's vision closer to fulfillment. Some of the events carry more significance than others and are signified by the longer drop-down arrows in the Figure 16–3. Those events mark the achievement of critical NARA objectives. The Lockheed Martin Team has developed a mapping between these major events, NARA's objectives and measures of success as shown in Table 16–3, Events and NARA Operational Objectives.

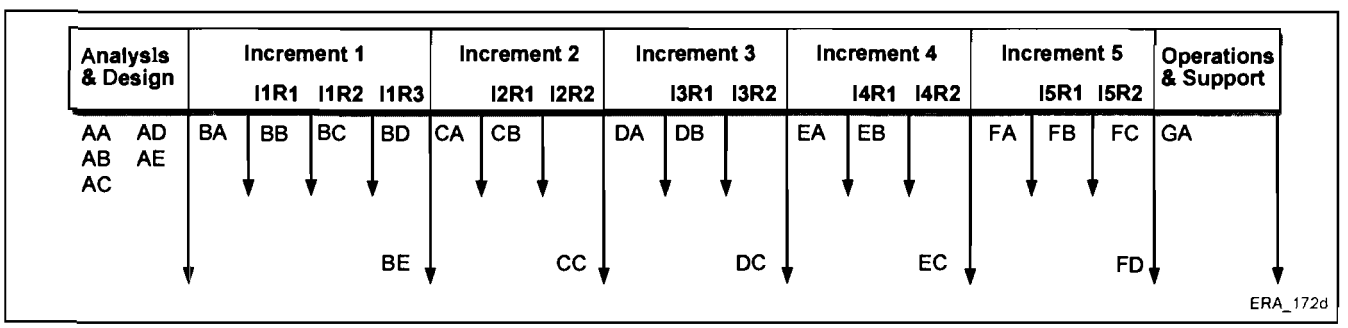


Figure 16–3. ERA Events Mapped to Lifecycle Phases

Integrated Plan Narratives

This section contains high-level descriptions of the key technical and management processes narratives for the ERA program. Each process is identified with a designator consisting of the specific CWBS element number with which the process is associated, and a capital letter suffix to uniquely distinguish the process from others associated with the same CWBS element. For example, the EVM Process designator is 1200B because it is the second (B) process associated with the 1200 Program Control CWBS element. Process names and CWBS elements are identified with ***bold italic font*** throughout the Integrated Plan content.

Integrated Process and Execution Framework Overview

The Integrated Process and Execution Framework, as shown in Figure 16–4, The Integrated Process and Execution Framework, provides a structured approach to process development and execution across the ERA program. Key processes are identified and mapped to functional descriptions. These key processes represent a subset of the complete set of processes that will eventually be used on the ERA program. Additional processes may be identified and added to the framework during the ERA lifecycle.

Table 16–3. Events and NARA Operational Objeetives

Event ID	Event	Lifecycle Phase	Operational Objective Achieved	Basis of Measurements
BE	Initial Operational Capability (IOC) Completed	Increment 1	• Template Repository and hierarchy established • Workflow capabilities established • Creation, modification, and processing of disposition agreements supported • Legacy re-engineering and retirement started • Initial validity, structure and format record checking capability established • Reliable ingest, storage, and output of electronic records achieved • Security architecture and infrastructure achieved • Institutional change management and training for NARA started • Initial deployment to NARA staff and targeted external user groups achieved	• Requirements documentation (SyRS) • System and acceptance test results • Security Accreditation obtained • Organizational Change documentation • Technical Performance Measures (TPMs)
CC	I2R2 (Development and Deployment) Completed	Increment 2	• ERA template repository is fully functional; population started • Records Lifecycle data is being routinely harvested. Records are being used as information sources • Preservation techniques for RTs and DTs with high ROI are started • Classified electronic records are being processed	• Requirements documentation (SyRS) • System and acceptance test results • Security Accreditation obtained • Organizational Change documentation • Technical Performance Measures (TPMs)

Event ID	Event	Lifecycle Phase	Operational Objective Achieved	Basis of Measurements
			• ERA system is more tunable, able to support larger user base • Interfacing with other NARA systems has been achieved • Subscription and service management allow for control of system resources	
DC	I3R2 (Development and Deployment) Completed	Increment 3	• Full RLC model is operational • System is integrated into Federal Enterprise Architecture and/or agency systems • Components are mature and stable • Schedule assist capability is available • Secure electronic transfer of classified electronic records has started • Technology insertion program has started • The shift from service emphasis to DR/RT has started • Storage subsystem services are fully implemented	• Requirements documentation (SyRS) • System and acceptance test results • Security Accreditation obtained • Organizational Change documentation • Technical Performance Measures (TPMs) • System Evolution Plan
EC	I4R1 (Development and Deployment) Completed	Increment 4	• System is capable of handling large growth in electronic assets • Technology insertion activities continue • Data extraction, asset analysis, and redaction capabilities are becoming more automated	• Requirements documentation (SyRS) • System and acceptance test results • Security Accreditation obtained • Organizational Change documentation • Technical Performance Measures (TPMs) • System Evolution Plan

Event ID	Event	Lifecycle Phase	Operational Objective Achieved	Basis of Measurements
FD	Final Operational Capability (FOC)	Increment 5	• System is capable of handling large growth in electronio assets • Technology insertion activities continue • Data extraction, asset analysis, and redaction capahilities arc becoming more automated	• Requirements documentation (SyRS) • System and acceptance test results • Security Accreditation obtainod • Organizational Change documentation • Technical Performance Measures (TPMs) • System Evolution Plan

The entire Lockheed Martin Team, including teammates and subcontractors, will adhere to the processes defined in this framework. The Lockheed Martin Program Director has the ultimate responsibility to ensure that the processes described in these narratives are implemented by the team. Process responsibility will be assigned to the entire organization; process compliance will be assured through the use of periodic audits and the monitoring of process metrics.

Program Process Baseline

A process baseline will be finalized during the Analysis and Design phase. Lockheed Martin uses an ISO 9001:2000 and Software Engineering Institute Capability Maturity Model Integration (SEI CMMI) compliant system called the Business Process System (BPS) to maintain process baselines. The BPS is populated with processes that are compliant with a number of Government and industry process models, including ISO/IEC 12207 Software Lifecycle processes, and IEEE 1220, IEEE Standard for Application and Management of the Systems Engineering Process.

Selection of the components of the ERA program process baseline is the responsibility of the Lockheed Martin Program Director, as is management, control, and improvement of ERA-specific processes. The Program Director must ensure compliance of these processes with applicable standards, a task which is made easier by the use of the standard BPS processes, as illustrated in Figure 16–5, The Business Process System (BPS). Tailoring of selected standard processes will be performed to ensure that they meet the ERA program's needs; the standard processes have been created to accommodate such tailoring.

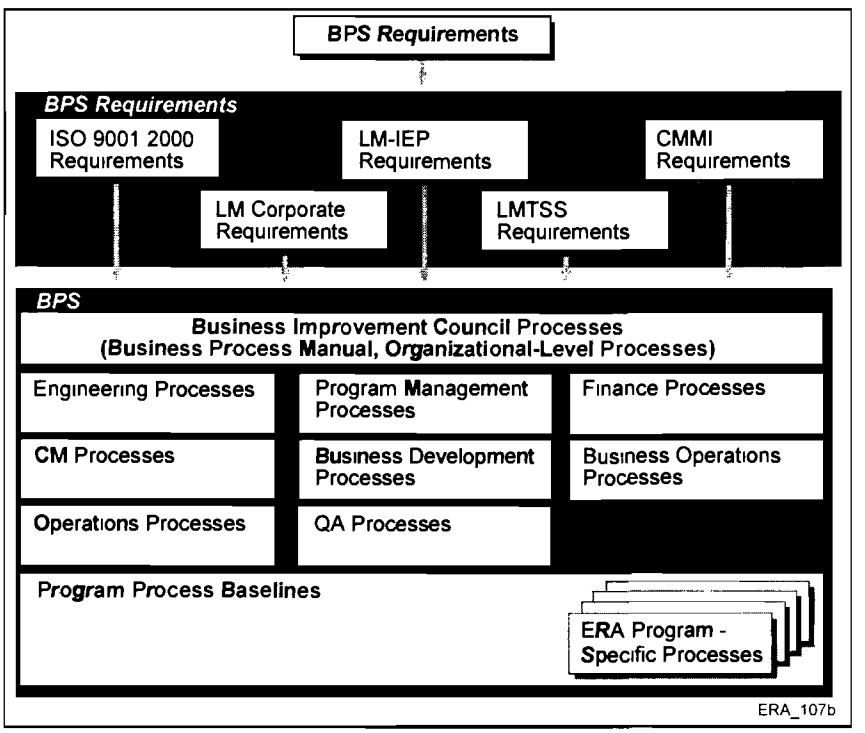


Figure 16–5. The Business Process System (BPS)

Program Performance Metrics

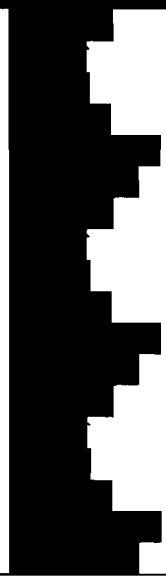
NARA has requested that the Lockheed Martin Team provide a set of metrics for program performance. Lockheed Martin requires the collection of measurements for programs and has extensive experience in capturing, tracking, and using many of the same metrics. Table 16–4, ERA Program Processes and Performance Metrics, identifies a metrics baseline along with the reporting method and frequency of reporting for the ERA program. In addition, many of these metrics will be available through the Program Dashboard, hosted on the Team Portal as described in ***1100F Communication Process.***

Table 16–4. ERA Program Processes and Performance Metrics

ID #	Process (s)	Metric	Reporting Method	Threshold	Frequency	Reported to:		
						NARA ERA-PMO	LM ERA Team	Lockheed Martin
1	1100A; 1100E; 1100F; 1100G.	Action Item Aging	Team Portal	See Note 2	Monthly	✓	✓	✓
2	3100J; 3100K, 3100L	Change Request Inventory	Team Portal	See Note 2	Monthly	✓	✓	✓
3	3100J, 3100K; 3100L	Defect management	Team Portal	See Note 2	Monthly	✓	✓	✓
4	1200B	Cost Performance Index (CPI)	EVM	[redacted]	Monthly	✓		✓
5	1200B	Cost Variance (CV)	EVM		Monthly	✓		✓
6	1200B	Estimate at Completion (EAC)	EVM		Monthly	✓		✓
7	1200B	Estimate to Complete (ETC)	EVM		Monthly	✓		✓
8	1200B	Level of Effort (LOE)	EVM		Monthly	✓		✓
9	1200B	Schedule Performance Index (SPI)	EVM		Monthly	✓		✓
10	1200B	Schedule Variance (SV)	EVM		Monthly	✓		✓

ID #	Process (s)	Metric	Reporting Method	Threshold	Frequency	Reported to:		
						NARA ERA-PMO	LM ERA Team	Lockheed Martin
11	1200B	Variance at Completion (VAC)	EVM	[redacted]	Monthly	✓		✓
12	1200B	To Complete Performance Index (TCPI)	EVM		Monthly	✓		✓
13	1100B	Risk Monitoring	MSR	See Note 2	Monthly	✓	✓	✓
14	3100G	Software Size	MSR	[redacted]	Monthly	✓	✓	✓
15	3400A, 3400B	Requirements Testability and Test Coverage	MSR		Monthly	✓	✓	✓
16	1400A, 1400B	Cost of Quality	MSR	See Note 2	Monthly	✓	✓	✓
17	1400A; 3100D.	Inspection Effectiveness	MSR	See Note 2	Monthly	✓	✓	✓
18	3100D 3100K	Defect Find-Fix-Verify Rate	Present at Design Review	[redacted]	Each SRR, PDR, CDR (Note 3)	✓	✓	✓
19	3100A	Engineering Affordability	Report Prior to Design Review		Each SRR, PDR, CDR (Note 3)	✓	✓	✓
20	3100D 3100G	ESLOC Productivity	Present at Design Review		Each SRR, PDR, CDR (Note 3)	✓	✓	✓
21	3100L 3200A	Requirements Volatility	MSR	[redacted]	Monthly	✓	✓	✓
22	3400A 3500	Test case Status	Critical Thread Review; MSR		Weekly (Note 3)	✓	✓	✓
23	1200B	Staffing	MSR		Monthly	✓	✓	✓

ID #	Process (s)	Metric	Reporting Method	Threshold	Frequency	Reported to:		
						NARA ERA-PMO	LM ERA Team	Lockheed Martin
24	3200A	Requirements Verification	Critical Thread Review; MSR		Weekly (Note 3)	✓	✓	✓
25	1200D	IS Task Completions	Critical Thread Review, MSR		Monthly	✓	✓	✓
26	1200D	Task Right Churn	Critical Thread Review		Weekly	✓	✓	✓
27	1200F	Data Delivery Timeliness	MSR		Monthly	✓	✓	✓
28	1200F	Data Acceptance Status	MSR		Monthly	✓	✓	✓
29	6200A	Time to respond during 0800 EST to 2000 EST	MSR		Monthly	✓	✓	✓
30	6200A	Time to respond during 2000 EST to 0700 EST	MSR		Monthly	✓	✓	✓
31	6200A	Time to resolve call or escalate	MSR		Monthly	✓	✓	✓

ID #	Process (s)	Metric	Reporting Method	Threshold	Frequency	Reported to:		
						NARA ERA-PMO	LM ERA Team	Lockheed Martin
32	1100H 6200A	ERA Staff Satisfaction with technical help desk	Present at quarterly reviews		Quarterly (portion of the ERA staff surveyed)	✓	✓	✓

Legend

Note 1: Reporting Method Acronyms. Monthly Status Report (MSR), Lockheed Martin Team Web Portal (Team Portal), Earned Value Methodology (EVM)

Note 2: Quantitative controls are not applicable to the Indicated metric.

Note 3: Since the identified metric is not applicable to the A&D effort, regular reporting will begin at designated points during Increment 1 development.

Priority 1

Mission critical system down or major module not functional
Business operations severely impacted
Significant business loss

Priority 2

Major module functionality significantly restricted or minor module or subsystem down
Business operations significantly impacted

Priority 3 (or less)

Business process impacted or suboptimal.

1000 Program Administration

The processes presented in the following sections describe the Lockheed Martin Team's approach to tracking and administering key processes for the program. Program Management, Program Leadership, Risk Management, Process Engineering, Measurements and Reporting, Communications, Program Control, Contract and Subcontract Management, Quality Management, and Supply Chain Management processes are discussed.

1100 Program Management

The program management processes provide a set of management tools to direct, coordinate, and control ERA technical and programmatic activities. The Lockheed Martin management philosophy employs an integrated management structure under the direction of the Lockheed Martin ERA Program Director. The Lockheed Martin Program Director has the complete

corporate authority to direct Lockheed Martin and its teammates in matters pertaining to ERA activities.

The ERA Program Director uses a Program Management Plan (PMP) to capture the definition of the organization, roles, and responsibilities to be used throughout the life of the ERA program. Lockheed Martin's PMP will be tailored during the Analysis and Design phase, and will be updated as required during each succeeding Increment.

1100A Integrated Product Development (IPD) Process

The Lockheed Martin Team will use an Integrated Product Team (IPT) structure as illustrated in Figure 16–6, ERA Integrated Product Teams (IPTs) structure, to manage the technical aspects of the ERA program. The program will be structured with five product-level IPTs, one deployment and operations IPT and one system-level IPT. Each product IPT will include membership from the team, ERA-approved NARA Subject Matter Experts (SMEs), and Independent Verification and Validation (IV&V) contractors.

Figure 16–6. ERA Integrated Product Teams (IPTs) structure.

The product IPTs will be focused on developing all work products required for their particular ERA system components. The system-level IPT will include the leaders of each of the product IPTs, will be led by the Chief Engineer, and will focus on component integration and any cross-component issues. The deployment and operations IPT will provide the cross-program/product

coordination for the successful deployment and maintenance of the entire NARA ERA system. The IPTs and their responsibilities are further described in Table 16–5, ERA Integrated Product Teams (IPTs).

Table 16–5. ERA Integrated Product Teams (IPTs)

IPT	Charter and Membership
System IPT	Responsible for the coordination and control of the development IPTs, including Ingest Services, Storage Services, Dissemination Services, Local Services and Control, and ERA Management. Membership includes the leads of the subsidiary IPTs, systems, software, and test architects, and representatives of the other core engineering functions (Reliability, Maintainability, and Availability [RMA]; Human Factors engineering; Quality Assurance; lifecycle cost management; specialty engineering) and IV&V contractors.
Ingest Services IPT	Responsible for the development of the Ingest Services segment of the system throughout the system lifecycle. Led by a segment lead, with accountability and authority for cost, schedule, and technical performance of the segment, the team includes systems, software, and test engineers, members from all other functional disciplines involved in the development, testing, and deployment of the team product (Reliability, Maintainability, and Availability [RMA]; Human Factors engineering; Quality Assurance; lifecycle cost management; specialty engineering), NARA SMEs and IV&V contractors.
Storage Services IPT	Responsible for the development of the Storage Services segment of the system throughout the system lifecycle. Led by a segment lead, with accountability and authority for cost, schedule, and technical performance of the segment, the team includes systems, software, and test engineers, members from all other functional disciplines involved in the development, testing, and deployment of the team (Reliability, Maintainability, and Availability [RMA]; Human Factors engineering; Quality Assurance; lifecycle cost management; specialty engineering). NARA SMEs and IV&V contractors.
Dissemination Services IPT	Responsible for the development of the Dissemination Services segment of the system throughout the system lifecycle. Led by a segment lead, with accountability and authority for cost, schedule, and technical performance of the segment, the team includes systems, software, and test engineers. members from all other functional disciplines involved in the development, testing, and deployment of the team product (Reliability, Maintainability, and Availability [RMA]; Human Factors engineering; Quality Assurance; lifecycle cost management; specialty engineering), NARA SMEs and IV&V contractors.
Local Services and Control IPT	Responsible for the development of the Local Services and Control segment of the system throughout the system lifecycle. Led by a segment lead, with accountability and authority for cost, schedule, and technical performance of the segment, the team includes systems, software and test engineers, members from all other functional disciplines involved in the development, testing, and deployment of the team product (Reliability, Maintainability, and Availability [RMA]; Human Factors engineering; Quality Assurance; lifecycle cost management; speciahy engineering), NARA SMEs and IV&V contractors.

IPT	Charter and Membership
ERA Management IPT	Responsible for the development of the ERA Management segment of the system throughout the system lifecycle. Led by a segment lead, with accountability and authority for cost, schedule, and technical performance of the segment, the team includes systems, software, and test engineers, members from all other functional disciplines involved in the development, testing and deployment of the team product (Reliability, Maintainability, and Availability [RMA]; Human Factors engineering; Quality Assurance; lifecycle cost management; specialty engineering), NARA SMEs and IV&V contractors.
Deployment and Operations IPT	Responsible for the deployment and operation of the ERA system. Led by the Deployment Manager, the team includes NARA SMEs, IV&V subcontractors, and all engineering staff involved in deployment of the system and system operations activities.

The IPT team structure is flexible and can evolve during subsequent phases in response to the changing needs of the ERA program. The ERA Program Director, who provides overall leadership and guidance for the program, has the authority to charter new IPTs as needed.

1100B Risk/Opportunity Management Process

Lockheed Martin uses a proven risk management process to manage, mitigate, and report risk on the ERA program. At the program level, the ERA Program Director owns the risk management process and maintains cognizance over all risk identification and mitigation to ensure timely risk resolution. The Director has assigned implementation and maintenance of the process to a Risk Manager. Risk identification and management is also a major responsibility of each Integrated Product Team (IPT) and its members. The Lockheed Martin Team has chosen to enhance the risk management process by analyzing each risk to identify potential opportunities for cost savings, schedule improvement, and product quality.

The objective of ERA risk management is to perform early identification, continuous tracking, and systematic reduction of elements that could impact the program's ability to meet its technical, cost, or schedule objectives. The ERA risk/opportunity management process documents the essential tasks, inputs, outputs, and objective evidence for effective management of each risk and opportunity on the ERA Program.

Risk Management includes several related actions: risk planning, risk identification and assessment, risk mitigation, and risk monitoring. The risk management process focuses on developing systematic methodologies which reduce the amount of subjectivity in evaluating risk and assures that a consistent set of weighting factors are used to place risks associated with a particular task in the proper perspective with other program risks. CDRL #9 Risk Management Plan, available on the Team Portal, documents the ERA program's risk and opportunity management activities, including the methods of identification, assessment, control, and reporting. The plan also identifies roles and responsibilities and establishes a baseline of identified risks.

The process, illustrated in Figure 16–7, ERA Risk Management Process, includes the following phases for identitication, management and mitigation of program risk:

- **Risk Identification.** IPT members, other team members, NARA, or management identify risks and opportunities on the program. Each item is documented in the risk database and allocated to the appropriate risk owner.
- **Risk Assessment.** Each risk item identified is assigned a risk level that determines the magnitude of the risk in terms of probability and impact. The risk level is used to determine the priority of actions to control or mitigate the risk. Opportunities are analyzed in a similar manner to the analysis of risks to document the potential benefit the opportunity could yield.
- **Risk Mitigation.** The risk owner establishes a risk mitigation plan. The risk mitigation plan documents the actions necessary to contain or mitigate one or more program risks. The risk owner may also develop an opportunity control plan, which documents the actions necessary to realize one or more program opportunities. The risk/opportunity plans are reviewed by the affected team members and approved by the Risk Manager.

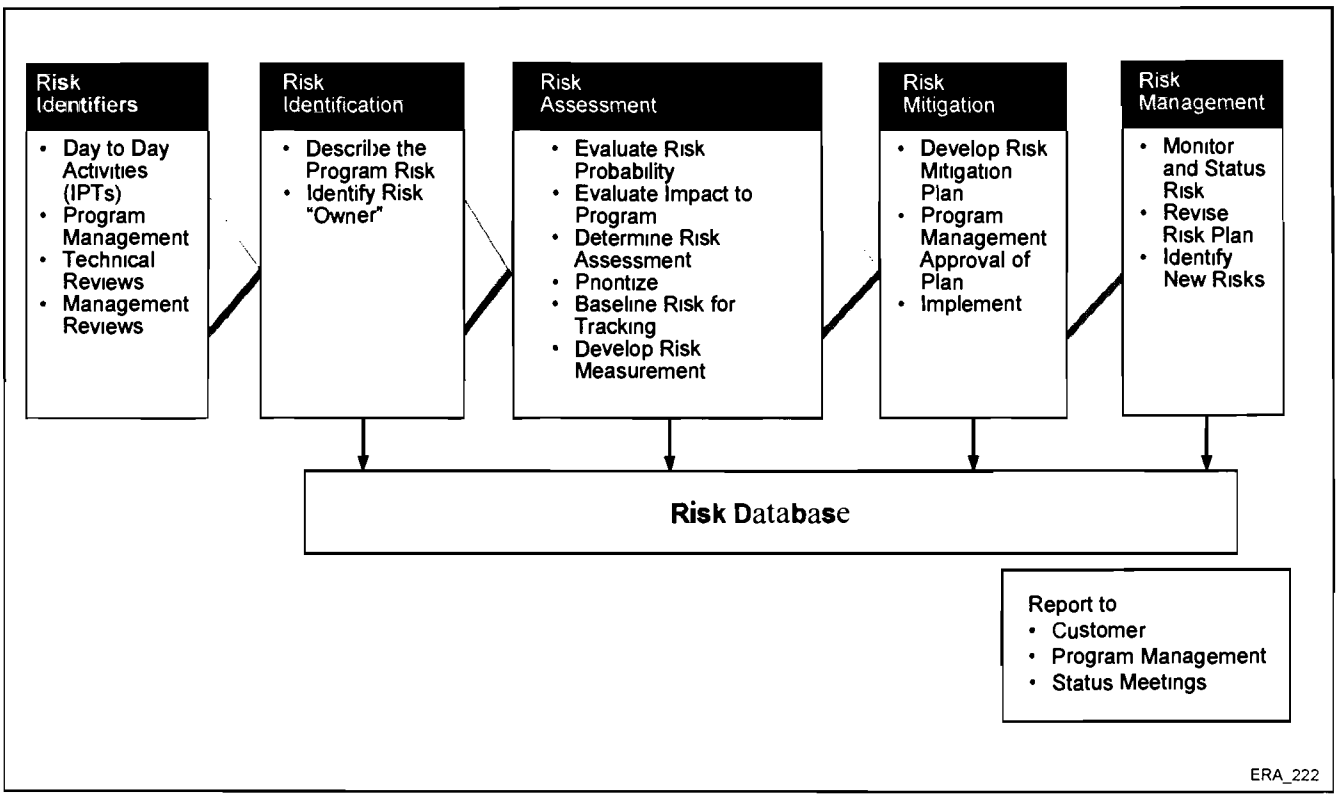


Figure 16–7. ERA Risk Management Process

- **Risk Management.** Periodic monitoring and reporting of the status of risk management activities are conducted throughout the program's lifecycle. The risk manager maintains a risk/opportunity status report containing summary information on all program risks/opportunities. This report is used to communicate status to program personnel, executive managers, and NARA.

When a risk is identified, the risk author performs an initial assessment and determines a potential mitigation plan. The risk and plan is reviewed by the IPT Lead. If accepted by the lead, the risk and plan are documented in the Risk Management Database. Ownership of the risk remains with the originating IPT unless the risk has been rated 'high'. If the risk is considered to

be high, the IPT Lead informs the next higher IPT that the risk has been identified. The Risk Manager may then decide to assign the risk to the higher IPT, or may downgrade the risk with concurrence from the originating IPT. In summary:

- Ownership of the risk is by the lowest level IPT that has purview over the risk.
- The risk author, along with the owning IPT Lead, develops a Mitigation Plan for all High and Medium risks.
- Mitigation Plans for High and Medium level risks must be approved by the Chief Engineer. All other mitigation plans may be approved by the appropriate Product IPT.
- The owning IPT implements the individual mitigation plan.
- All low-level risks are monitored on a continuing basis by the owning IPT.

A risk management interface is supplied by the WorkLenz product, through which the Lockheed Martin Team and NARA have access to a range of risk/opportunity reports. Principle among these reports is an overall risk summary that includes a listing of risks and prioritizes risks by potential impact. Risk trend analysis, predictions, schedule impacts, as well as concepts and areas at risk for schedule deviation are identified in the report.

1100C Process Development

Changes to the ERA program process baseline resuh from the addhion of newly tailored program processes, improvements/changes to existing tailored program processes, or the replacement of standard processes in the baseline by improved or corrected versions. The Lockheed Martin Business Process Manual (BPM) defines the policy for the development and management of all processes, ensuring that all standard and tailored program processes continue to meet the allocated requirements of applicable external and Lockheed Martin standards.

Changes to an existing process may be recommended by any Lockheed Martin Team member or by NARA. The Chief Engineer has the responsibility for determining whether or not to present the new process or potential change to the ERA Configuration Control Board (CCB). If a change is approved by the CCB, the newly amended process is documented and placed under configuration control, in the ERA program process baseline.

All processes are developed using the ERA standard process template, shown in Table 16–6, ERA Standard Process Template. Note that the process narratives provided in this Integrated Plan are high-level descriptions of processes. Newly defined processes that expand upon the narratives will conform to the standard process template.

Table 16–6. ERA Standard Process Template

Process Template Contents
Table of Contents
Overview
[High level description of the process covered by this document]
Applicability
[Any group or groups that this process applies to. Describe what each group's role and responsibility is in this process.]
Allocated Requirements (Lockheed Martin, ERA Program)
Objective Evidence Retention
[Include a statement describing how the objective evidence is controlled; Formal CM Control or Version Control]
Detailed Process Description
[Text of detailed process description]
Sub-process Descriptions (if necessary)
Sub-process 1 – [Name]
[Sub-process description]
Sub-process 2 (if necessary)
[Sub-process description]
Monitor, Measure, Analyze, Correct, and Improve
[The standard process shall specify methods for measuring key processes. These measurements shall demonstrate the ability of the processes to achieve planned results (e.g., process measurements, work product measurements, and service measurements)]
Terms & Definitions
[Definition of any terms and acronyms used in this document (if necessary)]

1100D Continuous Process Improvement

The ERA Program performs process improvement activities on a planned and an ad-hoc basis. A Significant Accomplishment, called Increment Planning, is scheduled for each program phase. During Increment Planning, program metrics and "lessons learned" are reviewed to determine potential process improvement candidates. For example, we will perform a causal analysis of test failures, the results of which may be used to update our test procedures, resulting in higher test success rates.

Lockheed Martin collects numerous metrics at all levels of the organization to determine the suitability and effectiveness of key processes. For example, a set of quantitative metrics will be defined during the Analysis and Design phase to track software process productivity throughout the program. These metrics will be added to and compared to historical organization data to track development progress. Over time, enhancements are made to the SW engineering methodologies, new tools are introduced, and new philosophies embraced. Effectiveness of changes is assessed by graphing the following trends: productivity, defect, and rework cost. The graphs show whether the organization is improving, maintaining, or regressing in these areas, indicating potential process improvement opportunities.

The Chief Engineer has the responsibility for reviewing the recommendations and presenting them to the CCB. The CCB may recommend that the process improvement activity be performed, may ask for more information, or may decide that the activity is not needed. NARA will be consulted about potential process improvements that directly affect the ERA program.

In addition to the ERA program process-improvement activities, Lockheed Martin has defined a Continuous Process Improvement (CPI) Process for the BPS that may provide benetits to the program and/or NARA. The CPI Process uses inputs from multiple programs to identify needs for new standard processes, shortcomings of existing processes, and areas of potential efficiency improvements. Since the ERA processes are stored within the BPS, the ERA program will benefit from the company-wide approach to process improvement.

1100E Measurements and Reporting Process

A systematic, quantitative approach to measurement and reporting of program status has been tailored for the ERA program. The approach, shown in Figure 16–8, Measurements an Reporting Process, uses a defined set of metrics, some required by Lockheed Martin for all programs, and others selected to meet NARA and the ERA program requirements. This quantitative approach consists of:

- Organization Quantitative Management and Quality Planning;
- Program Quantitative Management and Quality Planning;
- Metrics Collection and Analysis;
- Metrics Reporting and Baselining; and
- Metrics Action Resolution.

During the Analysis and Design phase, the ERA Program Director and the Chief Engineer will refine the initial set of metrics identified in Table 16–4. The Program Director has the overall responsibility for program management metric selection and maintenance, while the Chief Engineer has the responsibility for the selection of engineering metrics. The tinal set of metrics to be collected, the goals to be achieved, and the rationale for these goals will be documented in CDRL #10 Quality Management Plan (QMP), during the Analysis and Design phase.

The ERA program metrics charts are presented to the Program Director, focusing on any metrics that are not meeting goals and/or goal thresholds or that are outside of control limits. Selected metrics are presented to NARA during Monthly Status Reviews (MSRs).

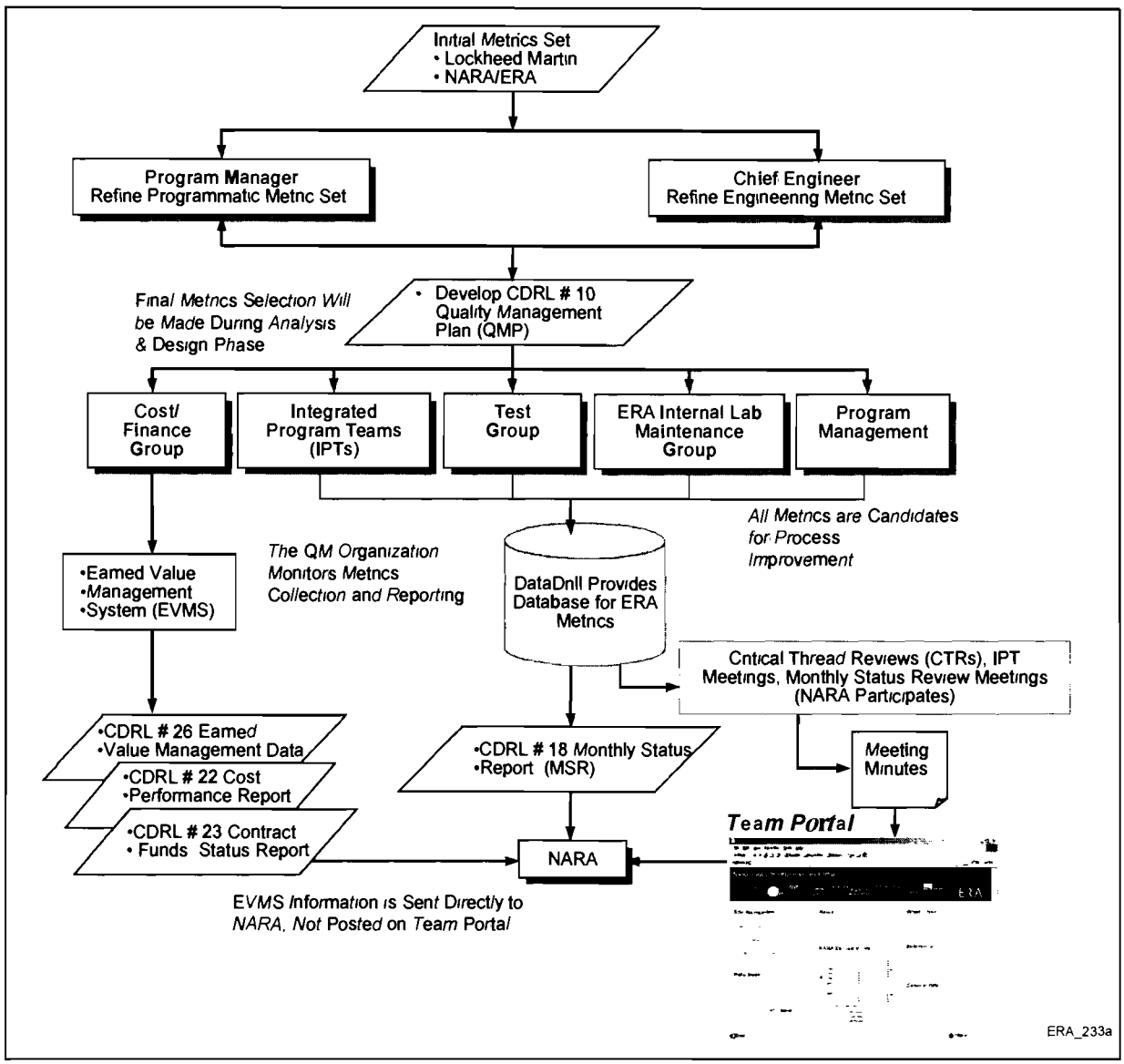


Figure 16–8. Measurements and Reporting Process

1100F Communication Process

The ERA Communications process provides a means for planning and controlling communication across the ERA program. The ERA Communication Plan captured within the ERA Program Management Plan (PMP) contains the guidance for formal and informal information exchange. The purpose of the plan is to establish and document clear lines of communication among NARA, stakeholders, NARA Associate Contractors, and the Lockheed Martin Team. The principle means for information exchange are Integrated Product Team (IPT) working sessions, program reviews and planning sessions, status reports and the use of the Team Portal.

The IPT organizational structure fosters teamwork and open communication throughout all levels of the project. As discussed in ***1100A Integrated Product Development (IPD) Process***, IPTs are composed of representatives from Lockheed Martin, partners, subcontractors, ERA-

approved NARA Subject Matter Experts (SMEs) and Independent Verification & Validation (IV&V) contractors. Inclusion of the SMEs and IV&V personnel provides a collaborative environment to resolve problems and rapidly develop solutions. Program information originates at the IPT level—where the work is performed.

A set of formal review milestones has been defined for the program. These milestones present an opportunity to discuss in-depth technical issues, for the Lockheed Martin Team to validate technical assumptions and for NARA to provide direction/clarification for issues. The milestones include CDRL #2 Systems Requirements Review (SRR), CDRL #4 System Design Review (SDR), CDRL #L29 Critical Design Review (CDR) and CDRL #L34 Preliminary Design Review (PDR). Technical Interchange Meetings (TIMs), are scheduled as needed and provide a means for exchanging technical information.

User working groups such as the security and accreditation group and the metadata group will be chartered during the Analysis and Design phase and will be active throughout the ERA lifecycle. The working groups provide the Lockheed Martin Team with an opportunity to share information with specific NARA experts and to refine our understanding of requirements and individual NARA concerns. The working groups provide NARA stakeholders an opportunity to understand the ERA program plans and activities. Other working groups will be chartered as needed during specific program phases.

Critical information collected during formal and informal meetings will be posted to the Team Portal, which will serve as the central repository for project documentation, status, and communication. The Team Portal is discussed in ***1200E Collaborative Electronic Environment Process.*** The ERA Program Dashboard, hosted on the Team Portal, provides real-time program status, and will be developed during the Analysis and Design phase. A sample dashboard is shown in Figure 16–9, Sample ERA Dashboard.

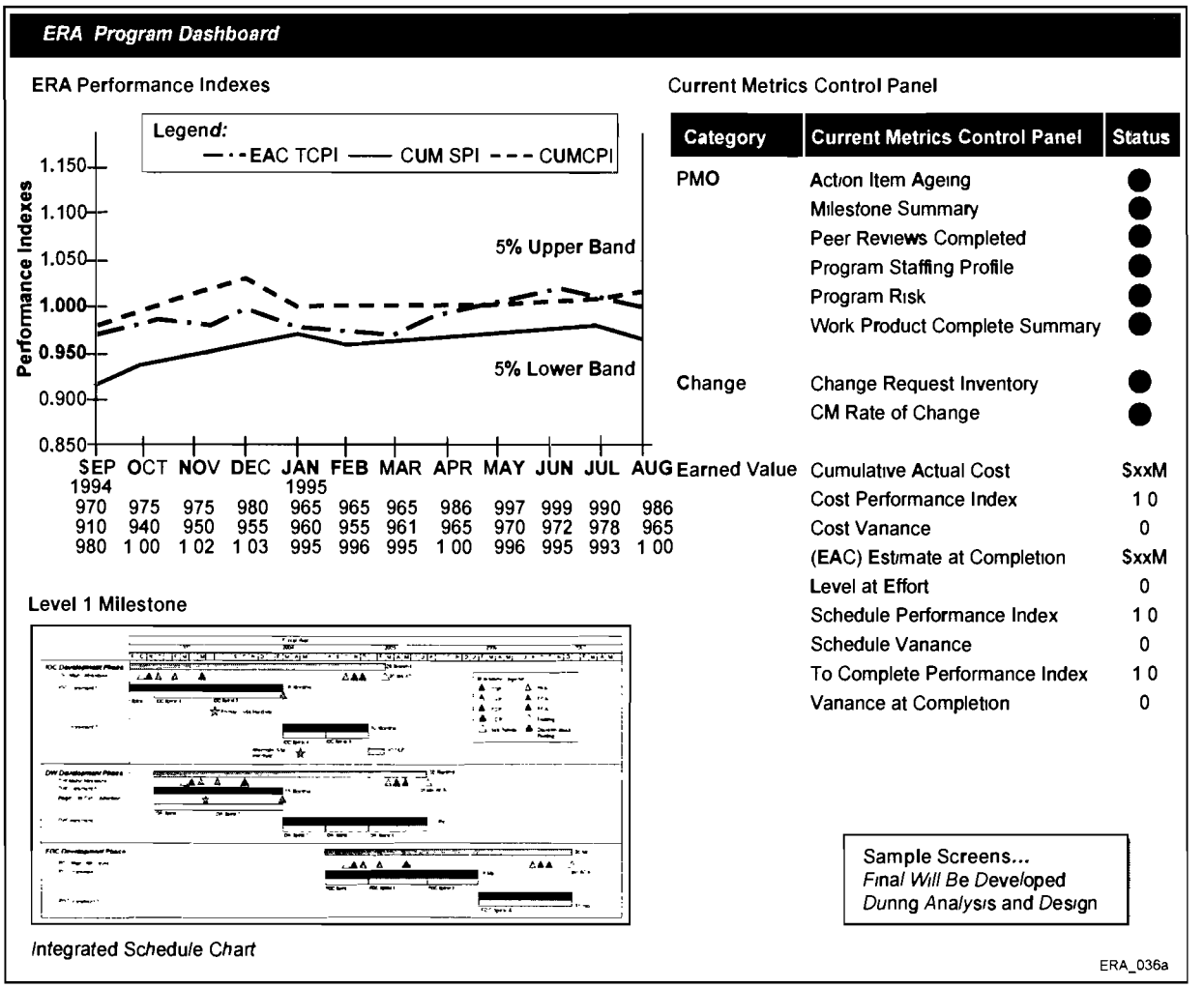


Figure 16–9. Sample ERA Dashboard

1100G Program Status and Reviews Process

The ERA Program Status and Reviews Process provides technical, cost, schedule, and supportability status to NARA through IPT meetings, System Critical Thread Reviews (CTRs), and Monthly Status Reviews (MSRs). IPT meetings expedite the presentation of traditional technical, cost, schedule, and supportability data and are the primary channels for exchange of program status information with NARA. CTRs focus on current critical path activities, providing visibility into the key aspects of overall system development progress so that corrective action can be taken if performance deviates significantly from plans. MSRs provide timely access to current technical, cost, and schedule performance. Meeting minutes, published on the Team Portal, are used to capture the salient discussion points, and provide a historical reference for critical program decisions.

A program calendar showing regularly scheduled meetings, will be developed and published during the Analysis and Design phase and maintained throughout the ERA lifecycle. The calendar will reside on the Team Portal, and will be available for review by all Lockheed Martin Team members and NARA.

Figure 16–10, ERA Regularly Scheduled Meetings, shows planned program meetings for the ERA program. These meetings provide forums for issue resolution and the means for monitoring/ guiding program performance. The figure also illustrates the ERA Issue Escalation path. Issues raised at the Product and Integrated Product Team (IPT) meetings, may be escalated to the system IPT, which may raise the issues to Lockheed Martin and/or NARA Program Manager staff meetings, etc. The ownership of an issue eventually resides at the appropriate level.

During weekly Integrated Product Team (IPT) meetings members review specific plans and progress, status of risk mitigation plans, as well as identify new risks and issues and determine mitigation and resolution approaches. The meeting focuses on component integration and resolution of any cross-component issues, promotes and disseminates communications between the IPTs, and assists with the mitigation and resolution of risks and issues escalated from the individual IPTs. From this meeting, the Chief Engineer determines the information for reporting to the Program Director's staff meeting, as well as, issues and risks where program management assistance is needed.

The Lockheed Martin Program Director holds a weekly staff meeting with the program's functional leadership where information from the System IPT meeting is reported, program issues and risks are reviewed and issues from the functional organizations are escalated. From this meeting, the Program Director determines the information for discussion with the NARA ERA Program Manager and provides an early "heads-up" regarding any issues or delays. The Lockheed Martin Program Director and the NARA ERA Program Manager meet weekly to exchange information regarding significant accomplishments. Any collaboration issues between the Lockheed Martin and NARA teams are addressed. Customer satisfaction with the Lockheed Martin team's performance is discussed and any failings identified and addressed.

The Program Cost and Schedule Review is held monthly and attended by the Lockheed Martin Program Director, program management staff, the System IPT, the NARA ERA Program Manager, his leadership and the NARA IV&V contractor. This review is conducted for all cost accounts and compares the work performed with what was planned, reviews the nature of any significant deviations or risks, and, where applicable, the corrective actions that are proposed to return to the plan. Also, an estimate at completion is provided for each cost account as well as the overall program, and cost and schedule performance metrics are reviewed. This information is analyzed and serves as input to the Monthly Status Review.

Subcontract Program Reviews are conducted monthly by the Lockheed Martin Subcontract Program Manager. The reviews establish a common understanding of the subcontractor's performance relative to the ERA requirements. Performance concerns are addressed and corrective action progress shared. Risks identitication is performed and mitigation progress of previously established risks is reviewed.

Technical Readiness Reviews (TRRs) are held at the appropriate time in the implementation life-cycle to gain concurrence with technical plans and specifications before proceeding into the next phase. These reviews provide a valuable communications opportunity. Each review is deigned to meet a specitic technical objective, with specitic technical artifacts serving as the basis for the

review and having specific acceptance criteria. Quality Assurance participates in these reviews and provides an independent assessment to Lockheed Martin Executive Management of the readiness of the program to proceed to the next phase. This information is analyzed and serves as input to the Monthly Status Review.

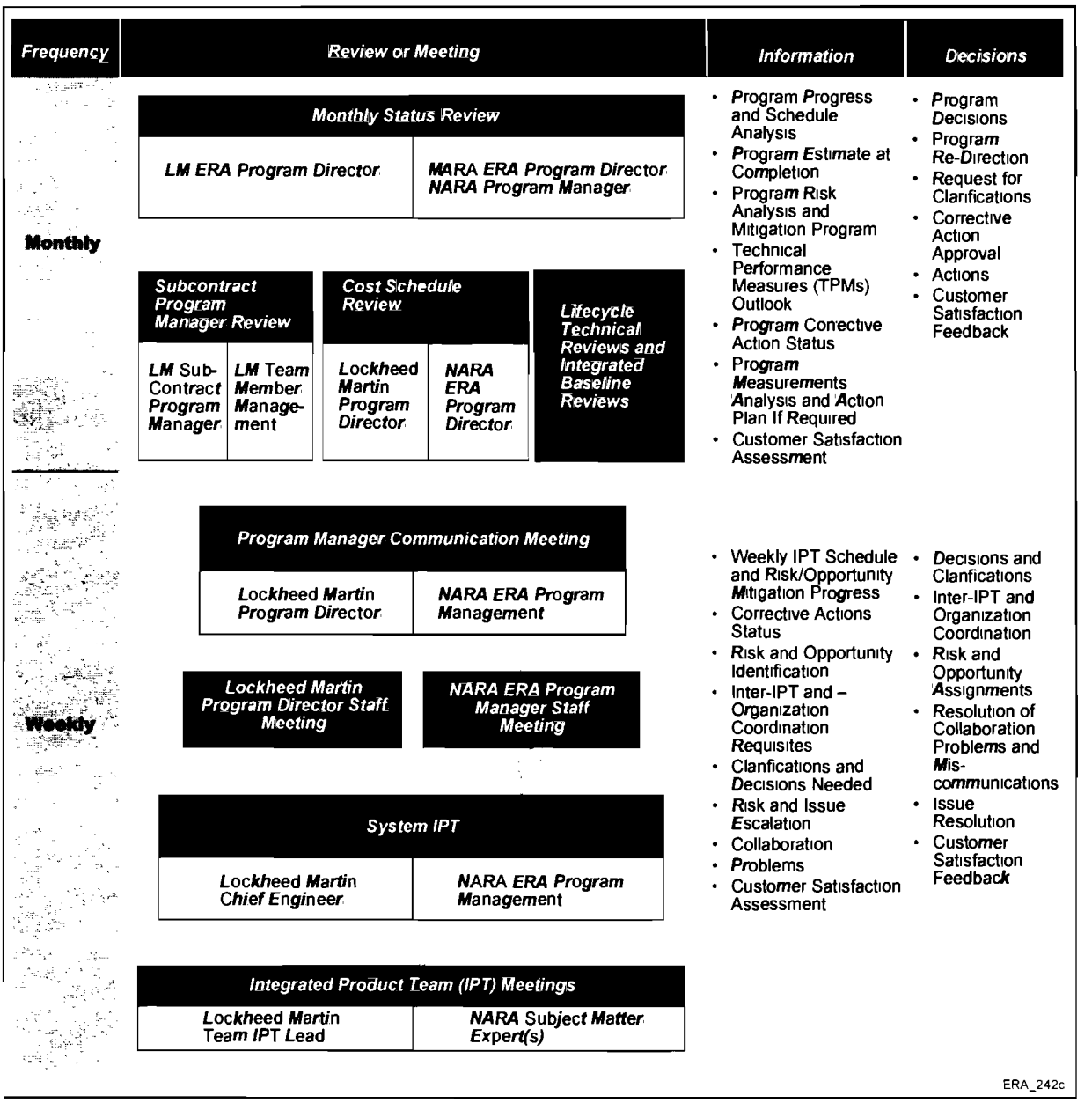


Figure 16–10. ERA Regularly Scheduled Meetings

The Monthly Status Review is attended by the Lockheed Martin Program Director, his staff, the System IPT, and includes the NARA ERA Program Director, NARA ERA Program Manager, their leadership and the NARA IV&V contractor. Items that may be reviewed during the meeting are shown in Table 16-7, Typical Monthly Status Review Agenda Items.

Table 16-7. Typical Monthly Status Review Agenda Items

Typical Monthly Status Review Agenda		
• Program High-level Status Summary • Recent accomplishments • Issues and Actions status • Upcoming milestones / checkpoints • Program level schedule review and critical path analysis • Schedule Management status and issues • Financial Management status and issues	• Risk Management • Status of Deliverables • Technical Status: By IPT • Performance Metrics for each IPT • Dependencies: By and between IPTs and with ERA PMO • Current customer satisfaction status/issues • Staffing Status; Security and clearance status • Subcontract Management	• Training status • Configuration Management • Quality Assurance • Data Management • Deployment, Operations, Maintenance and Support • Assessment of Federal Agency needs and problems • Assessment of new and currently deployed technology

An Executive Review is held quarterly for the Lockheed Martin Transportation and Security Solutions (TSS) Vice President and the Assistant Archivist for Human Resources and Information Services. It includes the Lockheed Martin Program Director, Chief Engineer, NARA ERA Program Director and Program Manager and their leadership. It provides an executive review of the program and highlights any risks to ERA meeting its desired goals. In addition, it serves as a forum to discuss customer satisfaction and review the progress of any related corrective actions.

As required, the Lockheed Martin Transportation and Security Solutions (TSS) President and the Archivist and/or Deputy Archivist of the United States may choose to meet to discuss the ERA Program performance. The purpose of the meeting is to redress significant program performance issues. If program performance necessitates, this meeting is scheduled regularly.

A special kind of review, called a Software/System Capability Evaluation (SCE) is held during each ERA program phase. The purpose of the SCE is to evaluate the Lockheed Martin Team's ability to meet process performance criteria as captured in the Capability Maturity Model Integrated (CMMI). The team gathers the objective evidence needed to show compliance and assists the independent evaluators who are performing the assessment by providing planning assistance and participating in interviews as needed. The results of the assessment are provided to NARA.

A program calendar showing regularly scheduled meetings, will be developed and published during the Analysis and Design phase and maintained throughout the ERA lifecycle. The calendar will reside on the Team Portal, and will be available for review by all Lockheed Martin Team members and NARA.

1100H Customer Satisfaction Process

The Lockheed Martin Team views every interaction with NARA as an opportunity to improve our performance. As shown in Figure 16–11, The ERA Customer Satisfaction Process, NARA customer satisfaction is captured and tracked at every program opportunity. A customer satisfaction topic is part of the Monthly Status Review (MSR), during which NARA will have the opportunity to discuss issues and identify potential improvements. Customer satisfaction issues are addressed as an essential element

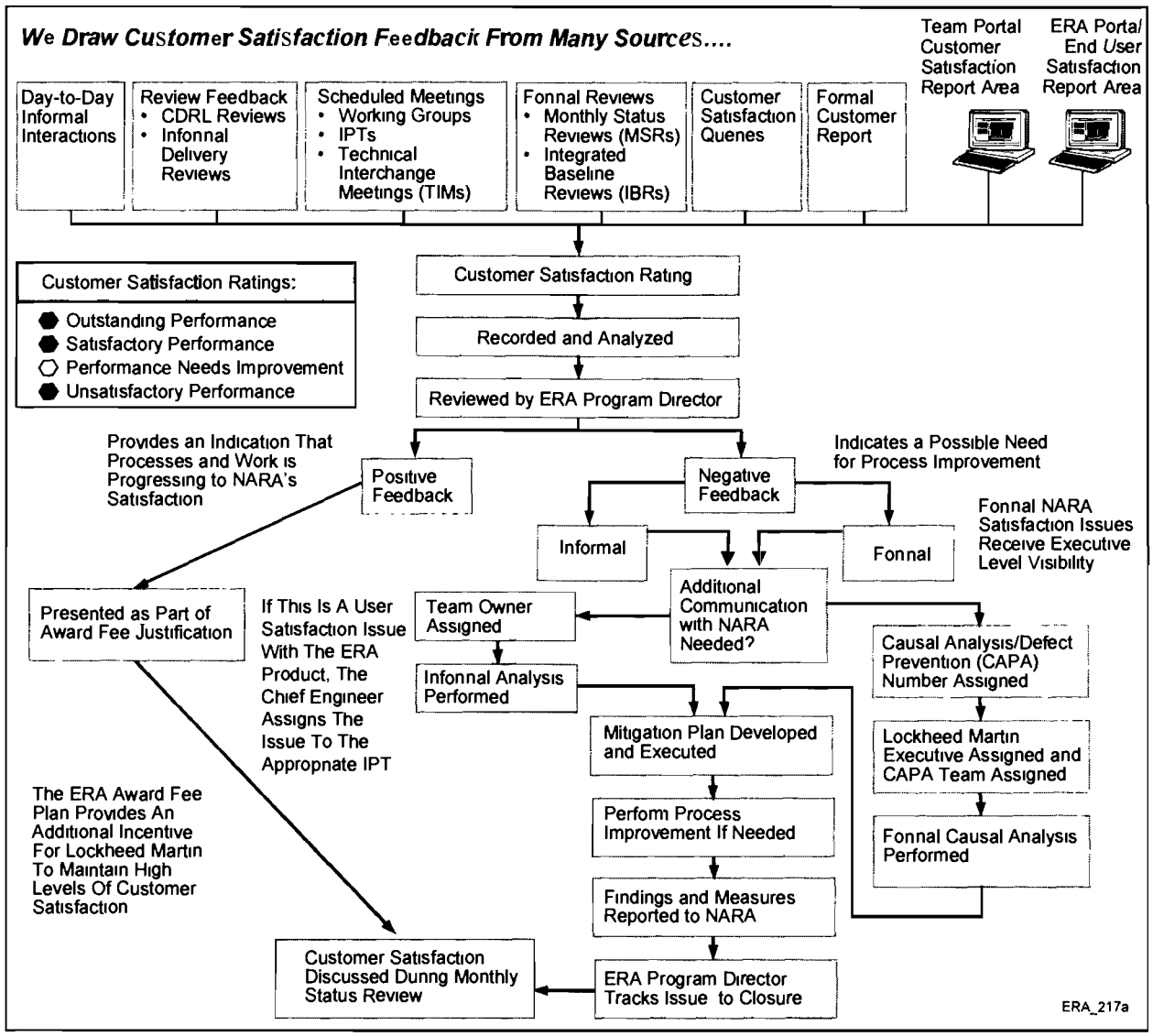


Figure 16–11. The ERA Customer Satisfaction Process

Of our daily program communications; the issues are documented, reported to the ERA Program Director, assigned owners and tracked to closure.

The Team Portal, used by the Lockheed Martin Team and NARA for internal program communication and the ERA Portal, used by ERA end users to access the ERA product, are designed to capture customer satisfaction feedback. The Team Portal provides a means for NARA to report issues regarding ongoing ERA programmatic activities; the ERA Portal captures

ERA end-user feedback for agencies and customers using the ERA system. End-user issues are assigned to the Chief Engineer, who directs the appropriate IPT to perform an analysis and define a mitigation plan.

Customer satisfaction issues may surface in the course of IPT team activities, scheduled program reviews, or in the day-to-day interactions between NARA and the Lockheed Martin Team. The ERA Program Director holds the responsibility of resolving the issues to NARA's satisfaction.

A formal customer issue is assigned a Corrective and Preventive Actions (CAPA) number and assigned to a Lockheed Martin executive for resolution. The executive assembles a CAPA team that executes a formal causal analysis activity to understand the root cause of the issue. The CAPA team also recommends very specific preventive measures to ensure the root cause does not reoccur on the ERA program or any other Lockheed Martin program. The findings and measures are reported to NARA; the Lockheed Martin ERA Program Director will ensure that the issue is tracked to closure.

1200 Program Control

Program control is the mechanism that ensures that the program remains on track. The ERA Program Control processes provides an integrated system for managing costs and schedules for the ERA program. The core foundation of those processes is the Earned Value Management (EVM) process which is used to plan, measure, and control costs and schedules and flows to all Lockheed Martin Team members.

1200A IBR Process

The IBR Process depicted in Figure 16–12, Integrated Baselines Review (IBR) Process, provides an opportunity for team and NARA personnel to develop and maintain a mutual understanding of the project objectives, the program management baseline, and the project risks.

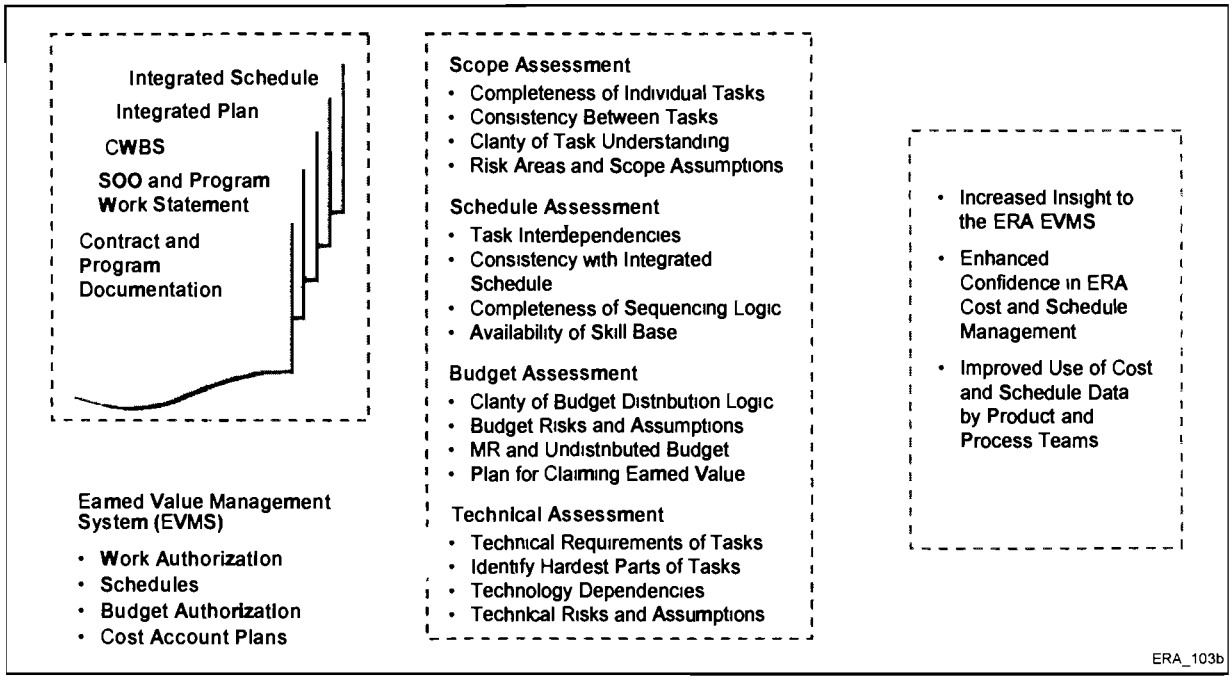


Figure **16–12. Integrated** Baseline Review (IBR) Process

The Lockheed Martin Team has incorporated a basic set of IBRs with preliminary dates into its Integrated Schedule based on NARA's request for multiple IBRs. The actual dates for the IBRs will be established upon review with NARA.

The IBR process established the foundation with NARA and the Lockheed Martin Team for the mutual understanding of program risks. It provides the Program Management Team the opportunity to review program expectations and to address differences before problems arise. The IBR process also provides the NARA Program Management Team with a thorough understanding of the project plan and its risks, allowing early intervention and the application of resources to address project challenges.

The three primary objectives of the ERA IBRs are:

1. Substantiate the existence of program baselines:
   a) Is there a controlled set of documents that adequately reflects NARA's requirements, clearly defines the design and approach, and identifies hardware and software configurations and the integration thereof?
   b) Is there a consistent set of hierarchical schedules that show dependencies and is up-to-date, i.e., actual vs. plan revised dates?
   c) Is there a time-phased cost management baseline that is in place, and reflects the schedules and plans through an accurate, up-to-date estimate at completion?
2. Assess the adequacy of ERA program and technical management plans and controls;
3. Assess the Lockheed Martin management team's understanding of program risks and plans to mitigate.

The key elements to be examined during the reviews are:

- Baselines and controls, including:

  - — Project plans, processes, and controls have been defined and implemented;
  - — Project cost, schedule, and technical baselines are in place and controlled;
  - — Staffing and critical resource plan;
  - — Integration and Test approach and acceptance criteria.
- Technical risks and associated risk management, including:
  - — Understanding of the program risks by the Management team;
  - — Understanding of proposal scope, risks, and associated assumptions by the Management team;
  - — Development and implementation of risk mitigation plans;
  - — Execution of an active, effective Risk Management process.
- Management, technical, and product metrics, including:
  - — Technical Performance Measures;
  - — Earned value and variance analysis;
  - — Ratio of measured vs. Level of Effort (LOE) cost accounts.
- Technical/Schedule/Cost integration, including:
  - — A controlled set of hierarchical schedules exist, are up to date, and accurate;
  - — An approved set of time-phased budgets exist, are accurate, and up to date;
  - — Performance and Schedule Management Practices are in place.
- Adequacy of Subcontract Management Plans.

The ERA Program Director will select a chairperson to lead and organize the review. After the IBR is conducted, action items and meeting minutes will be promoted to the Team Portal.

1200B Earned Value Management (EVM) Process

Lockheed Martin maintains a Corporate Policy Statement covering Program Performance Management. The team is applying Earned Value Management (EVM) principles to the NARA program, providing management with a means to measure technical, cost, and schedule performance. The EVM process is shown in Figure 16–13, Earned Value Management (EVM) Process.

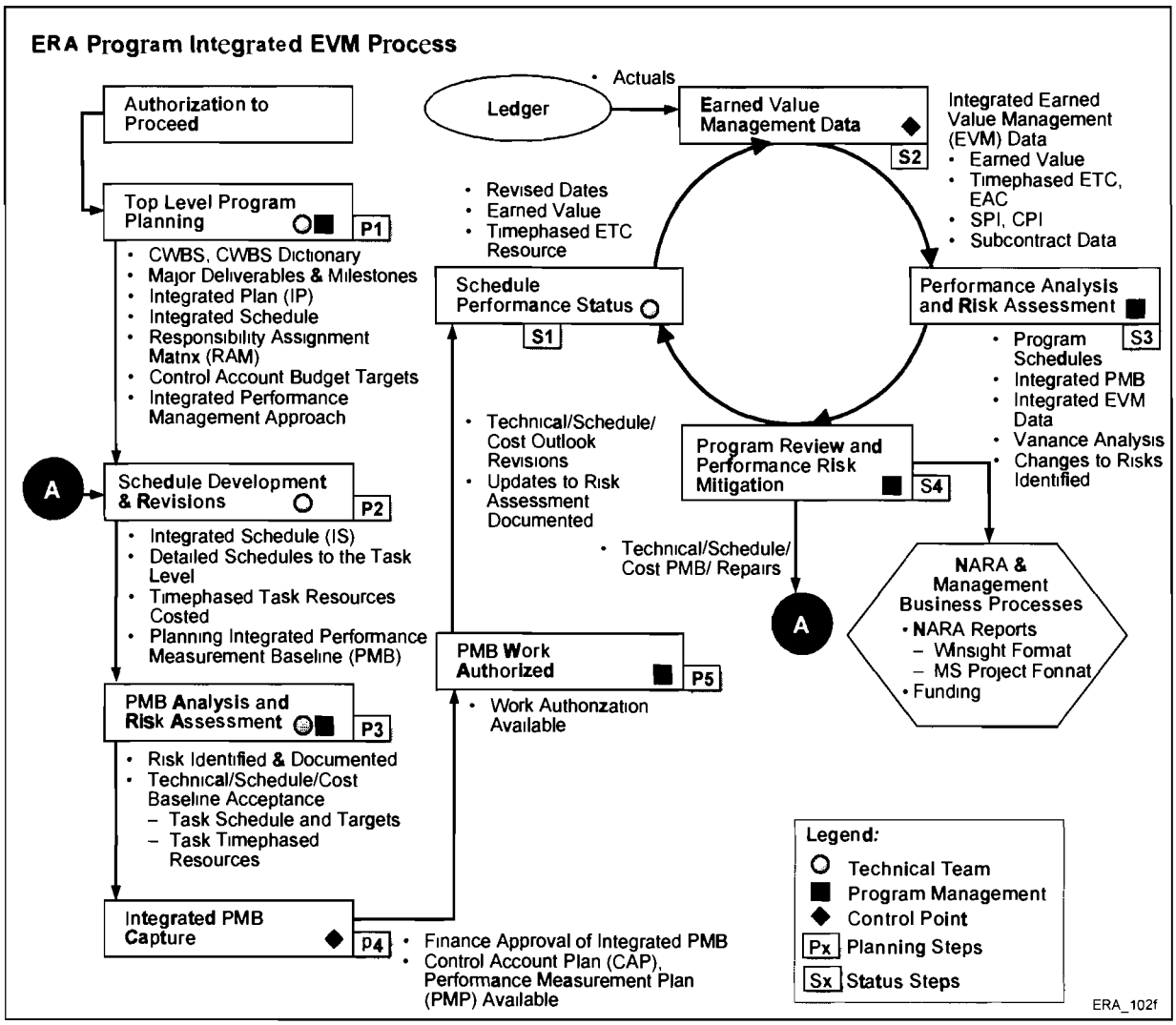


Figure 16–13. Earned Value Management (EVM) Process

Program Performance Management integrates requirements/scope, schedule, and cost objectives; establishes a baseline plan for accomplishing program objectives; and applies appropriate earned value techniques for program performance measurement during the execution of a program. The combination of advance planning, baseline maintenance, and earned value analysis provides a measure of accomplishment, cost/schedule performance, and predictive metrics. Program Performance Management elements include:

- Planning work scope, schedule, and cost objectives for the program to completion;
- Integrating program work scope, schedule, and cost objectives into a baseline plan against which accomplishments may be measured;
- Objectively measuring work accomplished and cost of work accomplished;
- Analyzing significant variances from the integrated baseline plan;
- Projecting schedule and cost variances based on performance to date and predictive measures;
- Providing data for decision making and implementation of management actions; and

- Providing accurate and timely estimates at completion.

This process is fully compliant with the ANSI/EIA-748-2002 Standard for EVMS and the LM Corporate Policy Statement CPS-026, Program Performance Management.

EVM data is reviewed regularly. The data is delivered to NARA as part of the CDRL #22 Cost Performance Report (CPR) and CDRL #26 EVM Data. Key EVM data will be available to NARA via the Team Portal. Our teammates furnish Lockheed Martin with EVM data as is necessary to ensure complete and accurate EVM reporting on the program. Lockheed Martin has already accomplished a significant amount of EVM work as part of our proposal response. The work that we have accomplished in developing an initial program schedule coupled with time-phased cost inputs will help speed the initial EVM baselining of the program and speed initiation of comprehensive EVM reporting upon contract award.

I200C Integrated Schedule Management Process

The ERA Program's Schedule Management Process, shown in Figure 16–14, Schedule Management Process, spans the entire ERA lifecycle, including pre-proposal, proposal, and contract performance. The intent of the process is to document procedures, tools, and measurements for:

- Establishing a schedule baseline;
- Monitoring work and analyzing progress against the baseline;
- Risk assessment/reduction activities;
- Re-baselining of plans;
- Forecasting completion dates for all activities; and
- Producing internal and/or external schedule deliverables.

Inputs to the Schedule Management Standard Process include:

- All program assumptions, including process, and technical baselines;
- All measurable elements of the negotiated contract, including the Performance Work Statement, and the Contract Data Requirements List (CDRL); and
- The Contract Work Breakdown Structure (CWBS).

For the ERA program, planned tasks, and dates are developed into an integrated schedule, then baselined, tracked, updated to current status, and managed through the remainder of the program.

The integrated schedule contains:

- Tasks;
- Type of activity (event, significant accomplishment, accomplishment criteria);
- A mapping to the appropriate CDRL;

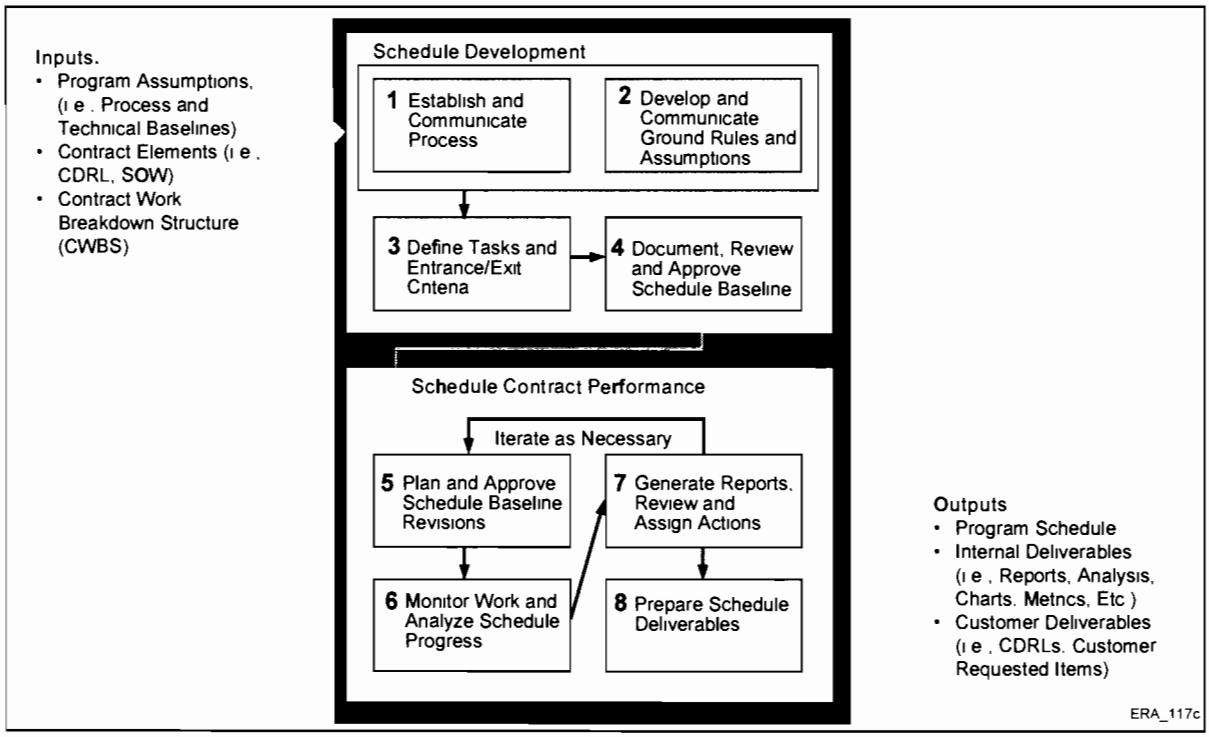


Figure 16–14. Schedule **Management** Process

- The process that maps to the activity;
- The CLINS in which the activity is performed;
- Opportunities for NARA involvement;
- The IPT (s) responsible for performance;
- The Program Phase;
- Unique CWBS element/ significant accomplishment and activity criteria identifications;
- Plan dates and estimated durations;
- Baseline dates;
- Predecessor and successor dependencies;
- Task ownership; and
- Total float values (for critical path analysis).

The Schedule Management Process consists of eight tasks, contained in two sub-processes. The first four tasks make up the Schedule Development sub-process and have been executed in the Pre-Proposal and Proposal Phases of the ERA program. The last four steps, which make up the Schedule Contract Performance sub-process, are performed in the ERA program Performance Phase.

- **Task 1** – Establish and Communicate Process: Following review of the schedule-related inputs, review and document the schedule management process.
- **Task 2** – Develop and Communicate Ground Rules and Assumptions: This task includes definition of program schedule levels and identification of tasks to be scheduled. Schedule levels range from Level 1 to Level 5 and detail from the highest level (Level 1) to the lowest level (Level 5) contractual events, milestones, and activities in the schedule.

- **Task 3** – Define Tasks and Entrance/Exit Criteria: This task defines work to be performed, establishes durations and identifies dependencies in the schedule.
- **Task 4** – Document, Review, and Approve Schedule Baseline: This step includes the documentation of the schedule baseline, as well as review and approval of the schedule by program management.
- **Task 5** – Plan and Approve Schedule Baseline Revisions: This task includes required steps for planning or re-planning schedule tasks.
- **Task 6** – Monitor Work and Analyze Schedule Progress: This step incorporates tracking of activity dates and progress, as well as analysis of the schedule.
- **Task 7** – Generate Reports, Review, and Assign Actions: This task provides for reports supporting planned schedule reviews to assess schedule process and determine actions necessary as a result of schedule reviews. Reports generated in this task provide an analysis of schedule activity date or duration changes and critical path analysis at summary/ detail levels in the schedule.
- **Task 8** – Prepare Schedule CDRL Deliverables: Based on contract requirements, this task provides for the creation and delivery of required schedule-related documentafion, including the Integrated Schedule Quality Assessment Report. The report is generated from the template shown in
Table 16–8, Integrated Schedule Quality Assessment Report Template.

Table 16–8. Integrated Schedule Quality Assessment Report Template

The Integrated Schedule Quality Assessment Report	
Note: per NARA requirements, this report must be delivered in Microsoft Excel '.xls' format. Date Report Prepared:	
Question	Response
Does the IS allow for the production of a pure logic activity plot for the entire critical path? The critical path being defined as a single series of continuously linked, non-summary, unconstrained activities that have a slack time (float) of between zero and +10 days?	
Is there a contractual requirement for all activities shown in the IS?	
Do all activities within the IS maintain a predecessor and successor relationship? If not, provide rationale justifying exceptions.	
Do all activities have an owner?	
How many activities are constrained and why?	
How many non-summary activities were scheduled to start or finish by Tim Now date but have not?	
Does the schedule conform to DI-MISC-811883A, Integrated Master Schedule, approved February 9, 1996, or to the contractor specified format chosen for delivery?	
Are all WBS levels represented in the schedule consistent with the current CWBS?	
Do all activities have an Earned Value Method identified in the MS Project 2003 Number 19 field?	
Was the schedule statused to the Friday prior to delivery?	

The schedule is updated weekly (more often if directed by the Lockheed Martin Program Director), and is delivered to NARA twice monthly in a Microsoft Project file. A sample schedule management cycle is shown in Figure 16–15, Schedule Management Cycle. The cycle will be finalized after consultation with NARA during the Analysis and Design phase. In addition, schedule reports and various analyses will be available through the Team Portal.

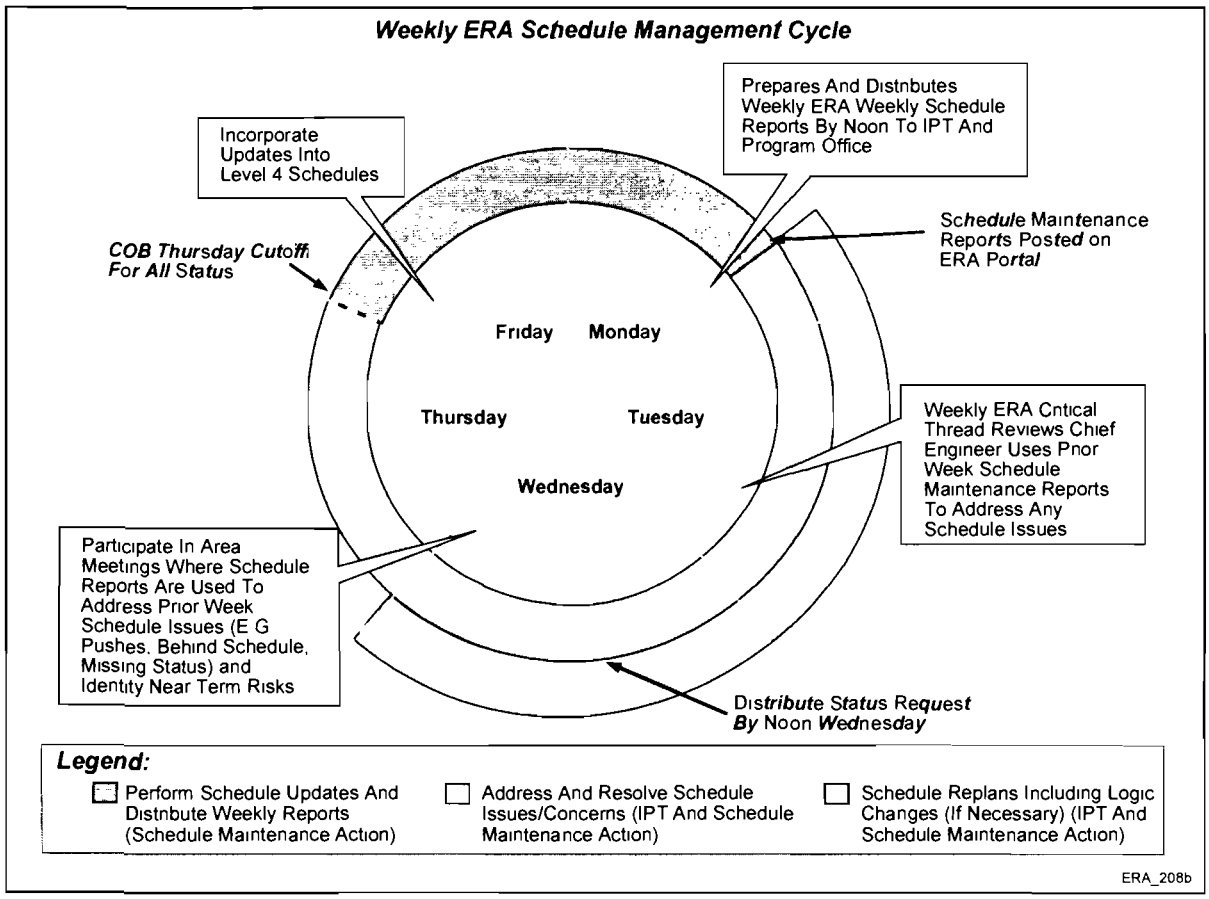


Figure 16–15. Schedule Management Cycle

1200D Integrated Schedule Analysis and Reporting Process

The Lockheed Martin Team's process for analysis and reporting, shown in Figure 16–16, Integrated Schedule Analysis and Reporting Process, incorporates real-time status of the following project activities collected from all team members:

- Program schedule
- Updates to the program schedule as they are made
- Program risks
- Risk mitigation plans.

The ERA Integrated Schedule Analysis and Reporting process utilizes a web-based project portfolio management tool that integrates schedule, cost, risk, and performance. The product, WorkLenz, integrates with Microsoft Project and analyzes performance across the ERA program to identify best practices, hidden operational obstacles, and potential cost savings.

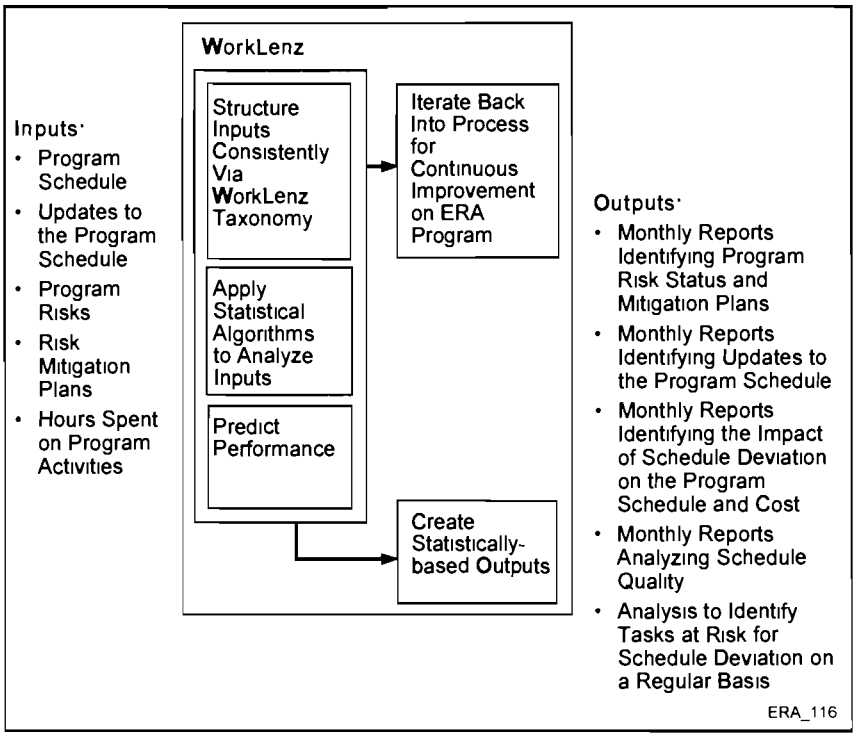


Figure 16–16. Integrated Schedule Analysis and Reporting Process

ERA program team members update program tasks and activities. As tasks are added to or removed from the schedule, impacts to future performance are identified. All team members update task status through a timesheet function, which also maps to CWBS data for the ERA program. Reports will be produced in real-time for regular Monthly Status Reviews (MSRs). Integrated Schedule deliveries to NARA will be in Microsoft Project format; a quality report will be delivered with the schedule.

1200E Collaborative Electronic Environment Process

A secure web page "portal" (https with PKI and 2-factor authentication) has been created to act as the entry point for accessing ERA program infrastructure tools and program information. The Team Portal contains a complete suite of infrastructure tools (Program Management, Engineering, Software and Document Configuration Management and Repository, Collaboration, Asset Management, Search Engine, etc.,) designed to provide the Lockheed Martin/ NARA Team access to key program assets. Browser access to the portal is provided externally via a Virtual Private Network (either individual user client or server-based user clients) or via a direct secure transmission link. The environment supports the ERA Program's defined processes with visibility and creation/editing capability, controlled at the project and user role levels. A sample Team Portal screen is shown in Figure 16–17, Sample of Items Accessible from ERA Team Portal. The portal design will be finalized during the Analysis and Design phase.

The persistent repository provided on the portal is generally used for document-related management (e.g., text, drawings, etc.,) for the life of the program and for sharing (viewing, editing, addition/deletion) of these documents in a controlled manner. In addition, an external

Virtual Conferencing System (eVCS) is provided for sharing information (e.g., presentations) during scheduled teleconference meetings of internal and external participants (e.g., Monthly Status Reviews, Working Team Meetings).

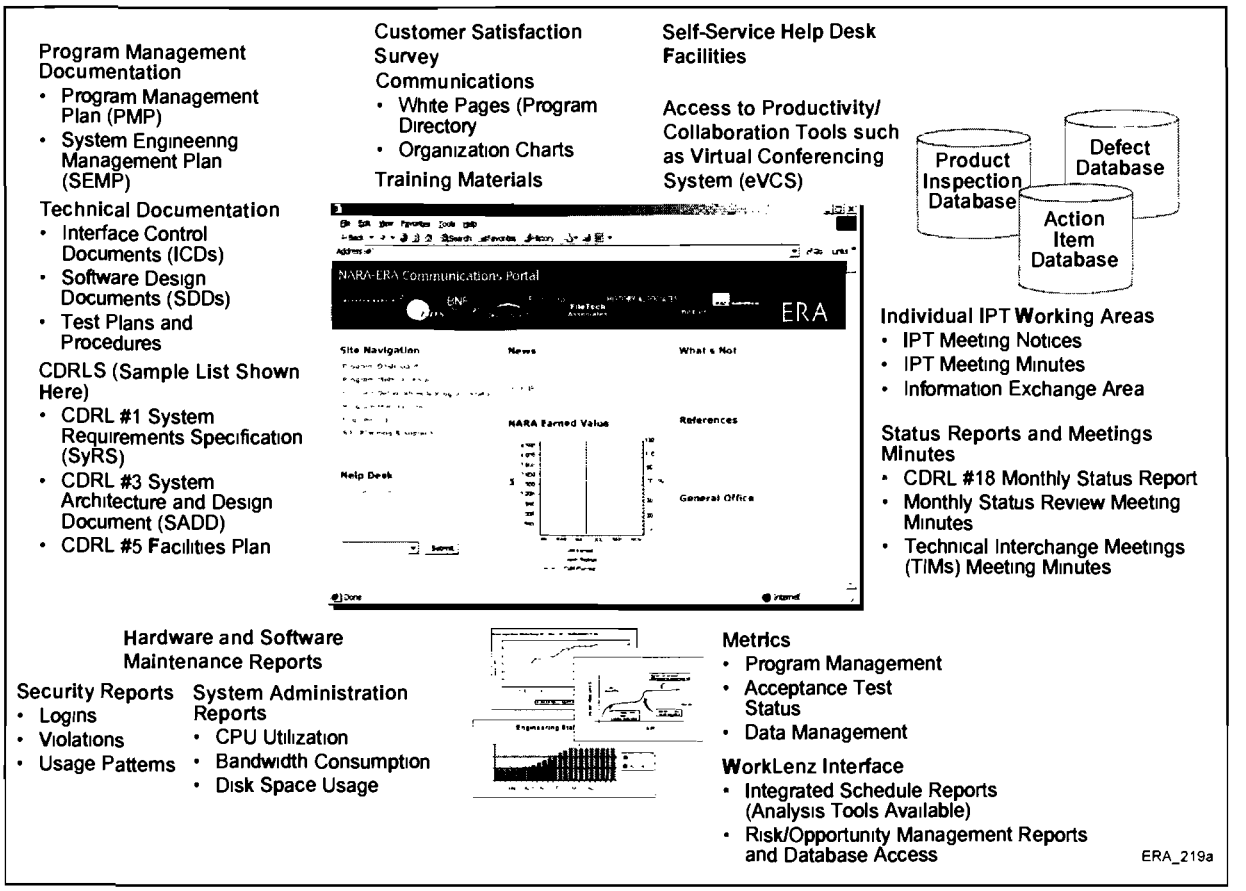


Figure 16–17. Sample of Items Accessible from ERA Team Portal

1200F Data Management Process

The ERA program manages all program deliverable data requirements through the Data Management (DM) process, shown in Figure 16–18, Data Management Organization Functions. This process includes the planning, administering, and control of all management, financial, engineering, and logistics documentation. The DM group develops the data management plan, implements procedures for managing data, and manages the activities to reproduce and deliver the CDRLs and contractual data.

The goal for Data Management is to create, deliver, control and maintain data in keeping with the mutually detined cost schedule and technical commitments made as part of the ERA contract. There are three very important functions within the process: they are ERA Data Management, ERA Data Administration, and the establishment and control of the ERA Data Library.

The ERA Data Management function sets data management policy and procedures. The creation, control, and submission of all documents generated under ERA is managed by the Data Manager. Specific Data Manager functions include:

- Setting up Data Management policy and procedures in compliance with ERA contract requirements
- Resolving all questions concerning contract data requirements, in conjunction with the Contracts office
- Establishing document formats and assisting with document preparation

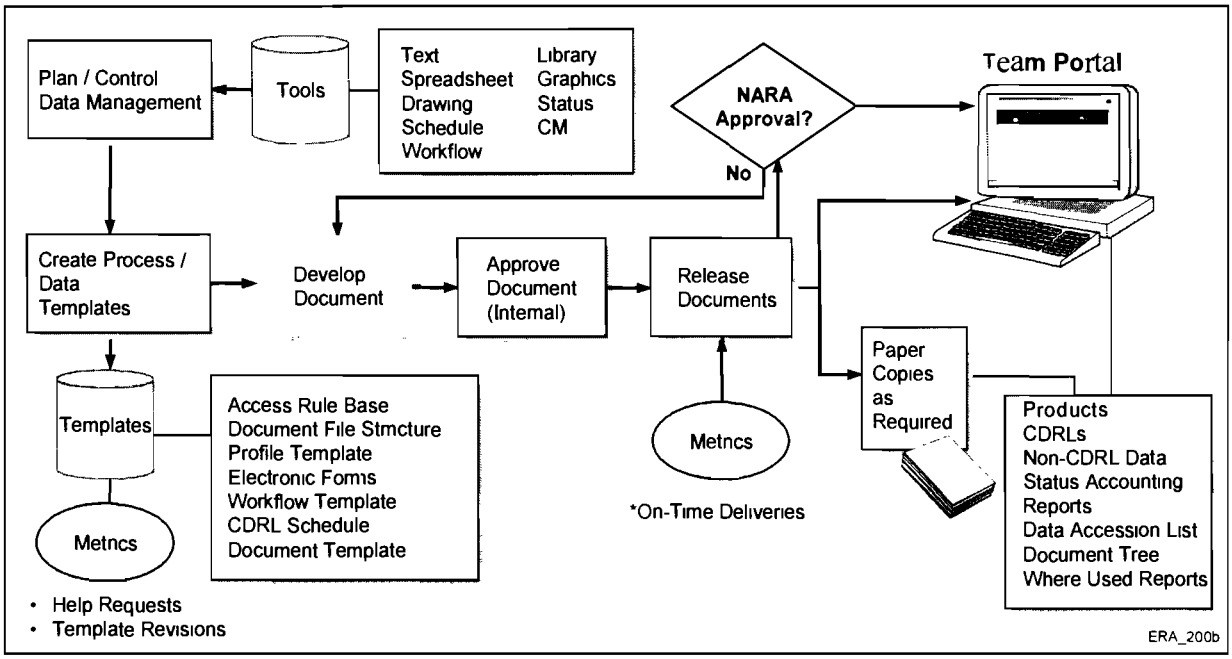


Figure 16–18. Data Management Organization Functions

- Assisting authors, reviewers, and approvers in understanding their roles and responsibilities, contract requirements, and the tools available for the creation or manipulation of documents;
- Ensuring that documents are reviewed, approved, and placed under configuration control in accordance with the SEMP;
- Ensuring that that the Contract Data Requirements List (CDRL) documents are prepared and submitted in accordance with CDRL requirements;
- Working with Configuration Management to control document identification, numbering, versions, and states; and
- Maintaining metrics to track Data Management status in terms of in-house usability and external customer satisfaction.

Data Administration includes the management and control of the ERA electronic data handling systems. Specific functions include:

- Establishing and maintaining the library architecture for data storage and retrieval;
- Supervising the data library functions, including training for new users;
- Assigning access permissions and restrictions;
- Setting up and managing the state changes;
- Maintaining data administration database tables; and

- Maintaining the Data Accession List (DAL).

The ERA Data Library contains reference materials in both electronic and paper form. The Data Librarian is responsible for maintaining these reference materials. Specific functions include:

- Providing assistance with locating paper and electronic documents in the walk-in data library;
- Filling orders for paper or electronic copies of documents; and
- Providing "help desk" functions for assistance with document preparation or retrieval, which includes Microsoft Office tools utilization and electronic data handling processes.

All personnel who prepare data for the ERA contract are required to implement Data Management procedures for document preparation and maintenance. For contract, baseline, and CDRL deliverables, the author's responsibility for data management extends from the document's creation until its release to Data Management for formal delivery. For informal documents, the author has responsibility for the document until archival.

The Data Manager will identify document development requirements and coordinate with the responsible IPT member to ensure that the document is prepared in accordance with those requirements. Every effort will be made to prepare documents using Microsoft Office (Word, PowerPoint, Access, Excel, Project), Visio, AutoCad, or other formats to which NARA agrees.

Data Management metrics, summarized in Table 16–9, Data Management Metrics, are collected and used to assess the efficiency and success of the process. The metrics are posted on the Team Portal.

Table 16–9. Data Management Metrics

DM Function/DM Process	Metric	Measurement Technique
Data Delivery	Timeliness	Log maintained of data deliveries matching ERA program schedule. On-time deliveries and late deliveries are indicated. 100% on-time deliveries = Success
Data Delivery	Accuracy/Adequacy	CDRL deliveries requiring approval: • Approval = success • Disapproval = deficiency Baseline document deliveries: • Acceptance = success • Request for revision or rewrite = deficiency

DM Function/DM Process	Metric	Measurement Technique
Data Delivery	Virus-Free Documents	Log is maintained of all documents received by DM with a virus attached. • No viruses detected = success • Virus detected & eliminated before further dissemination = acceptable • Virus not detected and transmitted = unacceptable

1200G Personnel Security Process

It is Lockheed Martin's policy to provide reasonable and adequate protection for all of its employees, equipment, facilities, proprietary information, and other assets; to properly safeguard all classified material, and other materials entrusted to it by customers, suppliers, or U.S. Government Agencies; and to cooperate with U.S. Govemment Agencies as necessary to ensure the security of the United States and its interests. The Lockheed Martin Team's ERA site will institute a comprehensive security program that complies with the applicable laws and regulations; corporate, business area, and business unit policies and procedures; contractual requirements; and security measures directed by the corporate Security Office. The ERA workforce has the continuing responsibility to be alert to potential or actual security violations including, but not limited to, breaches of security, misconduct where criminal acts are known or suspected, and malicious acts against persons or property. Employees will report such incidents to local Security. Security will investigate the incidents and report violations to the cognizant U.S. Government Agencies as required. At times, Federal Agencies engaged in intelligence collection, law enforcement, or counter-terrorism may request information or assistance from a workforce member that is outside of the member's normal work responsibilities. If this occurs, the member will immediately notify local Security.

Visitor Control is a vitally important means of controlling access to facilities and sensitive information. It assists in the prevention of workplace violence, potential loss of assets, and unauthorized disclosure/theft of sensitive or classified information. Visitor control is implemented through the issuance of the appropriate type of visitor badge. Visitors to the facilities are granted either "Escort Required" or "No Escort" levels of access, in accordance with their business relationship and the purpose of the visit.

When at NARA facilities, ERA workforce members will comply with NARA security policies and procedures in accordance with the Visitor Group Security Agreement. This agreement stipulates methods for obtaining access to NARA facilities, controls of classified information, and security of computing resources. Contractor personnel requiring frequent access to NARA facilities should be presented to the Contracting Officer's Representative (COR) for approval. Workforce members needing access to NARA facilities require photo identification badges on a schedule to be determined by the COR. The badges will be made by NARA utilizing supplies, materials, and equipment provided by NARA. The workforce member is required to sign the appropriate badge at the time of photographing. Special contract Requirement H-6, Identification/Building Pass, contains additional specific requirements.

All workforce members scheduled to perform work on the ERA contract (including subcontractors and consultants) must review, understand, and execute a "Non-disclosure Agreement" prior to starting NARA-contracted assigned work. The program management team ensures that original Non-disclosure Agreements are submitted to the COR within three working days of workforce member starting work.

Lockheed Martin has the ability to process DoD Secret, DoD Top Secret, and Special Access Clearances. The clearance process is started once the appropriate agency has agreed to sponsor the candidate; a pool of cleared personnel is available to work immediately.

1300 Contract and Subcontract Management

Contract processes include coordination of all contract issues between the Contract Manager and the NARA Contracting Officer, managing agreements with other contractors, work authorization, and contract change management. The subcontract management processes insure compliance with warranties, subcontractor agreements, and management of small and disadvantaged business subcontracting goals, as well as managing the acquisition process. The following processes comprise the group of key contract management processes for the ERA program.

1300A NARA Associate Contractor Interface Process

During the Analysis and Design Phase, the Lockheed Martin Team, with NARA support, identifies the NARA Associate Contractors. Within the Program Management Plan, the program communications plan defines the plamed interactions with the NARA Associate Contractors; the Integrated Schedule is updated to reflect key planned NARA Associate Contractor interactions. NARA provides concurrence and/or suggestions for the plamed Associate Contractor Interface interactions. As NARA Associate Contractor interactions occur, meeting or event minutes are documented. The results of the interactions are assessed against the plan; action items are assigned and monitored to completion. Action items may include providing additional information to NARA Associate Contractors, revising program communications plan or reassessment of the ERA design.

1300B Procurement Process

Suppliers are evaluated and selected, and purchases are tracked, monitored, and controlled through the use of the closed-loop process shown in Figure 16–19, Procurement Process.

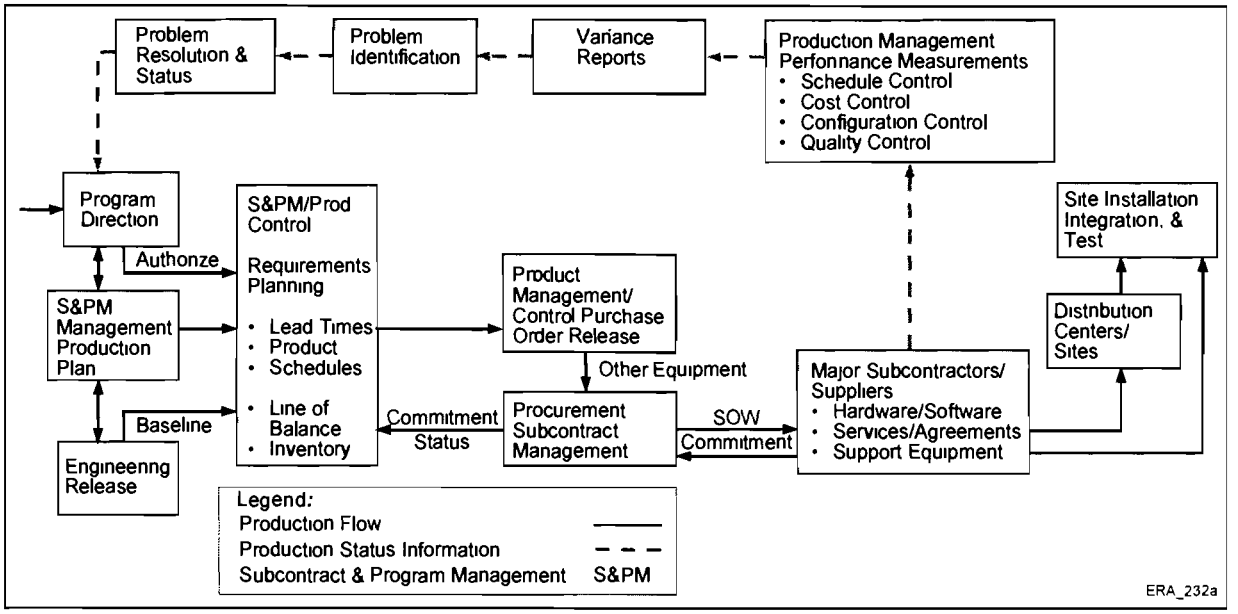


Figure 16–19. Procurement Process

The responsible IPT documents the HW/SW technical requirements. In accordance with the ERA configuration control process, the Configuration Control Board (CCB) assesses the change to the COTS baseline. Upon CCB approval, the ERA Bill of Material (BOM) is updated and the ERA Subcontract and Production Management (S&PM) organization generates formal requisition documents for the purchase requirements.

If a competitive selection of products will occur, the Subcontract Administrator prepares the selection criteria. Upon receipt of the formal requisition and the appropriate hardware/software specifications from the technical team, the Subcontract Administrator initiates a formal solicitation (RFQ/RFP). RFQ/RFP responses are evaluated for source selection, responsiveness, completeness, and best value and other criteria specified in the selection criteria, and a supplier is selected. The Subcontract Administrator prepares a procurement justification file including cost/price analysis, any required certifications, and management approvals. The purchase order is placed with the selected source and the formal requisition is completed. This file is maintained for a defined period of time after closure to ensure support to any customer closeout requirements. The file is not closed until performance and delivery requirements are met.

1300C Maintenance and Service Agreements Process

Management of the ERA COTS product baseline includes the management of the associated maintenance/service agreements. The specification of maintenance requirements, vendor maintenance solicitation and response, and Lockheed Martin evaluation and selection of COTS HW/SW maintenance occurs within the ***1300B Procurement Process***. The Maintenance and Service Agreements process involves the activities associated with tracking, control and renewal of maintenance and service agreements after product receipt.

Upon completion of the receipt verification of HW/SW COTS products, the receipt is documented in the ERA COTS Inventory Database including all licensing, warranty, maintenance agreement, and service request flow information. Vendor product registration forms

are completed and returned to the vendor. COTS software assignment information and hardware serial numbers and location information are also maintained in the COTS Inventory Database. Automatic notification occurs for impending expiration of maintenance agreements. The program evaluates the need for the maintenance agreement extensions and the subcontract management team initiates extension actions as required.

1300D Subcontract Management Process

To enhance program control, Lockheed Martin establishes a subcontract management team for each subcontract consisting of a Subcontract Program Manager (SPM), a Subcontract Administrator and selected members of the Technical and Finance staffs to manage subcontracts and procurements for the Program Manager. The Subcontract Program Manager is responsible for the success of the subcontract with primary responsibility for the day-to-day technical, financial, schedule management and administration of terms and conditions. The Technical Point of Contact guides the technical aspects of the subcontract, providing technical direction as needed and supporting the Subcontract Program Manager.

The ERA subcontract management process includes the qualification and selection of the subcontractors, control of contract scope, regular communications, quantitative and qualitative periodic performance assessments, and prompt resolution of issues. Table 16–10, ERA Subcontract Management Process, summarizes the ERA Subcontract Management Process.

Table 16–10. ERA Subcontract Management Process

Step	Result
1. Identify the Subcontract Management Team	Funding is allocated and Subcontract Program Manager (SPM), Subcontract Administrator (SCA), Technical Point of Contact, and Financial Point of Contact are selected.
2. Define and Plan the Work to be Subcontracted	Subcontractor work specifications are derived from the program's statement of work.
3. Determine Acquisition Approach	Subcontractor selection strategy is established (e.g., sole source versus competitive; large business versus small business) and plan is prepared.
4. Identify, Qualify & Select Subcontractor	Subcontractor selection occurs consistent with the source selection criteria.
5. Develop & Use Contractual Agreement	The SPM and SCA establish subcontract terms and conditions and statement of work consistent with Lockheed Martin policies and practices.
6. Review, Approve & Use Subcontractor's Plans	The SPM monitors the subcontractor's performance against an agreed upon plan.
7. Resolve & Incorporate Changes to Subcontract SOW	Subcontract changes are incorporated consistent with the program's change control process.

Step	Result
8. Hold Periodic Subcontract Program Management Reviews	Subcontractor performance against schedule, cost and technical baselines are reviewed, issues, risks and dependencies are identified, and resolution actions are assigned.
9. Monitor Subcontractor's Quality Assurance Activities	Lockheed Martin's Quality Assurance organization monitors the subcontractor's activities and work products to ensure conformance with program processes and quality objectives.
10. Conduct Review & Acceptance Verification of Subcontractor's Products	Subcontractor deliverables are verified within the IPT and accepted consistent with predefined acceptance criteria.
11. Conduct Program Subcontract Review	Subcontractor evaluations reviewed; performance against small business goals assessed.

1300E Nondisclosure Agreement (NDA) Process

The ERA contract requires that all personnel working on the ERA program sign a NARA Nondisclosure Agreement. A Lockheed Martin Nondisclosure Agreement Interface Representative is designated from within the Program Control function. All program personnel are briefed on the requirements of the NARA Nondisclosure Agreement and return the signed agreement to the Lockheed Martin Interface Representative. The ERA Subcontract Administrator ensures that all subcontract personnel sign the NARA Nondisclosure Agreement. The Interface Representative maintains a log of all signed Non-Disclosure Agreements. All signed NARA Nondisclosure Agreements are sent to the NARA Contracting Officer's Representative no later than three days after contract award or after new personnel have joined the program.

If disclosure of NARA proprietary information is needed, a written request for Government agreement for disclosure (specifying the proposed party/ies for disclosure, the information to be disclosed, and the need for the disclosure) is sent to the NARA Contracting Officer by the Lockheed Martin Contracts representative. Upon written agreement for disclosure, the Lockheed Martin Interface Representative maintains a control log of this approval and the associated disclosure(s).

1300F Contract Change Management Process

The contract change management process provides an integrated approach to capture contract changes and ensures the management of, and compliance with, changes to contract tasking, pricing, terms, or conditions. A thorough assessment of all changes is made to identify any impacts to ERA requirements. It encompasses all aspects of official contractual change actions, including modifications and engineering change proposals.

Change Origin

Changes may be requested by the ERA or Lockheed Martin, and may be caused by revised technical/deliverable requirements, revised budgets affecting limitation of funds/cost, technology

insertions or subcontractor requests for a change, deviation, or waiver. They may also be caused by an engineering change proposal/value engineering change proposal (ECP/VECP), or other factors. The Lockheed Martin ERA Program Manager, in coordination with the ERA COTR, will coordinate their review of all potential changes to ensure their applicability against ERA requirements and their potential impacts to ERA's objectives.

Change Impacts

A thorough assessment will be made as to what will be impacted by any change. As changes may affect ERA goals, all changes will be thoroughly reviewed to understand the impact of the change on the ERA's stated goals.

ERA formal change requirements are identified through written communication between NARA's Contracting Office and Lockheed Martin's Contract Administrator (CA). The CA and Lockheed Martin Program Director will review all changes for potential impacts to existing requirements by the process detailed below. Once reviewed and approved, in accordance with the process defined below, appropriate steps are taken to amend the contract.

Request Processing

Upon receipt of a request from the Contracting Officer for a contract change, or a formal direction to effect a contract change, the Lockheed Martin CA will acknowiedge its receipt back to the CO and immediately provide the change request to the Lockheed Martin Project Director.

The Project Director will convene a meeting with Contracts, Sub-contracts, Pricing, and affected technical personnel (including sub-contractors and team members as appropriate) to review and assess the requirement. This part of the process will be tailored to the size, scope, and complexity as appropriate.

Should a formal proposal be required, it would include the following tasks:

- Defining requirements for sub-contractors/vendors as required and obtaining the necessary inputs;
- Assessing design, development, test and implementation impacts and generating Basis of Estimates (BOEs) for all aspects of the proposed change;
- Calculating, based on inputs received, the costs and any risks associated with implementation of the desired change; and
- Coordinating the documenting of assumptions and dependencies.

The technical team will convene to analyze the new requirements, estimate the magnitude of the task, and establish a high-level technical approach. The team will also assess the impact of change on (and risk to) the overall system architecture, cost, schedule, and system interfaces.

Proposal Submittal

After conducting an internal review and approval of the tinal proposal, Lockheed Martin Contracts will transmit the proposal to the customer by the most expeditious means practicable.

Review Process
The CA will conduct an Executive Review and Approval meeting to ensure that the Lockheed Martin internal reviews of proposed changes are accomplished and acceptable before finalizing the change by approval of the Contracts and Business Practices organization. If there is a Configuration Management or Change Management Process documented for the program, the CA will also follow that process for approval of any modification. If the modification is an administrative modification (unilateral, usually with no change to contract value, scope, or terms and conditions), a formal Executive Review and Approval meeting is not required, but the program office will be notified of the change.

Negotiation/Execution
After submittal to the customer, Lockheed Martin will be prepared to immediately discuss or negotiate the contract change with the customer. At the conclusion of successful negotiations and upon agreement by both parties to the change, the Executive Review and Approval meeting will issue a bilateral contract modification. Upon receipt of the contract modification, Lockheed Martin will conduct a brief review and approval cycle and sign and return the document to the customer. The Executive Review and Approval meeting of any modification will result in the CA entering all contract modification data into ECS and completing a Contract Summary for ERA program distribution. The Contract Summary includes a summary of the modification changes, including:

- Changes in Contract Value by Contract Line Item Number (CLIN) and in total (including the amount of the change and the new total);
- Changes in Funding Limitations by CLIN and in total (including the amount of the change and the new total);
- Any changes in Terms and Conditions;
- Any changes in Scope of Work; and
- Any new Product Code/Cost Accumulator.

Implementation of Change
Upon receipt of the executed contract modification, the Lockheed Martin Contracts Administrator will enter the pertinent information into an electronic contracting system (ECS), which is a central electronic repository for all contractual data. Budgets are allocated across the appropriate cost accounts, culminating in work authorizations being signed by the Project Manager.

The Project Manager will issue a project directive to authorize work to proceed, and the program baseline will be updated to reflect the change. The CR Database is updated to reflect "Approved" status for the change request.

1400 Quality Management

The quality assurance processes provide a vehicle to ensure all ERA products and services meet or exceed quality standards and ERA requirements. The Quality Assurance group reports directly to the company president and has the authority to prevent any non-conforming product or service from being delivered or provided. Quality Assurance personnel have regular interaction with ERA Program Management and the Integrated Product Teams (IPTs) on a daily basis.

The Lockheed Martin Team provides the Quality Assurance (QA) group with the freedom to be an independent set of eyes and ears for senior management and NARA. Our Quality Management System (QMS) approach, shown in Figure 16–20, The ERA Quality Management System, is designed to capture, summarize, and support evaluation/inspection results in the form of process and product metrics.

The QMS is procedure-based, planned, and actively performed. Quality reviews are mapped to work products and are scheduled throughout the product lifecycle activities. QA's approach to accomplish stated goals, objectives, and quality requirements is through participation in all engineering activities throughout the product development cycle. QA core activities include:

- Evaluations of software and hardware products against criteria based on the lifecycle phase;
- Evaluate formal deliverable documentation prior to delivery;
- Perform supplier audits/evaluations, product inspections/supplier ratings;
- Monitor Dry Runs/Acceptance testing to ensure System Requirements are fully tested;
- Support/participate/provide status on formal reviews;
- Inspect incoming supplier products to defined criteria;
- Inspect assembled hardware to drawings/shop orders;
- Perform Internal Audits to assess compliance to ISO and CMMI ratings;

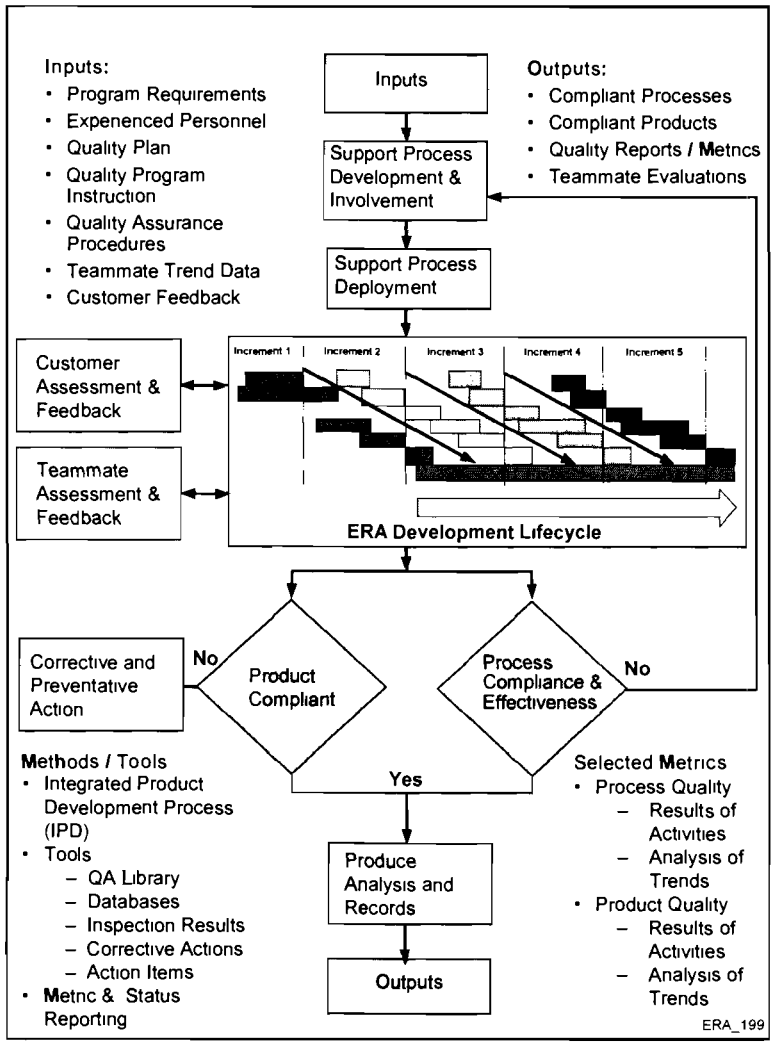


Figure 16–20. The ERA Quality Management System

- Participate in key program meetings, working groups, boards, and IPTs; and
- Provide continuous support to the IPTs in collection/analysis of ERA metrics.

1400A Quality Audit Process

ERA Program audits are performed to verify that processes, procedures, activities, and products are compliant with program requirements. They are also used to proactively identify strengths and opportunities for improvement. A QA audit plan will be prepared at the beginning of the Analysis and Design phase.

A quality checklist will be prepared, using the relevant ERA requirements, standards, processes, specifications, etc., to aid the auditor during the performance of the audit. Using the audit checklist as a guide, interviews will be conducted, work products will be reviewed, and objective evidence will be verified. Any discrepancies identified will be documented and tracked to closure by invoking the corrective and preventive action process. Audit results will be documented in an audit report and distributed to the affected parties and to program management. The corrective and preventive action process includes root cause analysis and

corrective and preventive action as applicable. Closure of the discrepancy occurs after verifying the effective implementation of the action taken.

1400B Independent Assessment Process

The ERA Program Management Team uses the Independent Assessment Process to idenfify program risks/opportunities early and create risk/opportunity mitigation action plans to increase the probability of program success. These independent assessments are performed on a scheduled and ad hoc basis as program circumstances warrant. There are a variety of independent assessments that are employed throughout the lifecycle of the ERA program. Each assessment has a well-defined methodology and process to deliver the desired result (e.g., CMMI SCAMPI, ISO surveillance audit, IBR, etc.). However, all independent assessments have the common element of bringing in personnel from outside the program to provide an independent, non-biased assessment of program performance against the assessment criteria. The independent assessment team presents the findings at an out-briefing to program management. These findings are then prioritized and brought to closure by appropriate means such as Quality Assurance corrective action processing, program management action item tracking, integration into the baseline program plans and invocation of the continuous improvement process.

1500 Supply Chain Management

The Supply Chain Management Process ensures that hardware definition and design, supply vendors, and architecture development work collaboratively prior to and during development and update of the ERA system BOM. This ensures that changes are made in a controlled manner while ensuring the most cost-effective access to technology updates in a rapidly changing technology environment.

1500A Bill of Material Management Process

The ERA Hardware Engineering Lifecycle Process defines the steps involved in creating, refining, and controlling a system hardware definition for the ERA Program. A hardware baseline was established during ERA pre-proposal activities, and will continue to be refined throughout the ERA lifecycle. The current ERA baseline includes a preliminary physical architecture diagram, a list of hardware components, a hardware architecture description, and a proposal BOM.

Once the hardware baseline is established for a program, it is placed under configuration control. Changes to the baseline must be approved by the ERA CCB. Since the final hardware baseline is not completed until late in the ERA lifecycle, intermediate baselines may be created, which can be used for ERA pricing, design reviews, procurement, and modeling activities. The duration of the program phases, the complexity of the system, and the rate of change of the hardware definition may drive the creation of intermediate baselines, as illustrated in Figure 16–21, Hardware Definition Phases.

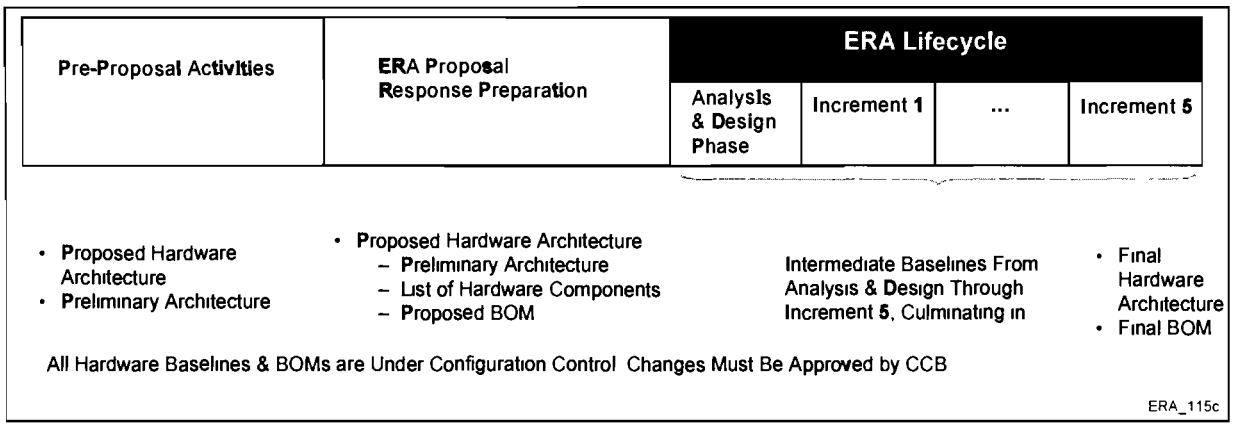


Figure 16–21. Hardware Definition Phases

A BOM is created once a baseline is established. As ERA system design activities progress, a series of technical reviews is held to verify the accuracy and completeness of the BOM and the specifications required for procurement, installation, and configuration. Once the BOM's validity is established, it is placed under configuration control and entered into OHM. Any changes to the BOM must be submitted via a Change Request (CR) to the CCB for approval. Depending upon the requested change, the CCB may request an impact analysis before approving/denying a change.

2000 ERA Architecture and Evolution

Architecture engineering processes constitute the set of processes involved in identifying, investigating, and analyzing requirements, operational concepts, and technologies to assess their impact or applicability to the ERA system architecture and then incorporating them into a high-level enterprise and system designs. These processes integrate all system design and development work into one coherent ERA evolution plan that meets the objectives and requirements for the "to be" ERA system. Five-digh codes are used to identify each process (e.g., 2000A).

2000A ERA Business Value Process

The ERA Business Value Process, illustrated in Figure 16–22, ERA Business Value Process, is part of an iterative enterprise process that is initiated with Strategic Planning. The Strategic Planning Process is an enterprise-level process that provides guidance to ERA as well as to all other NARA programs. The ERA Business Value Process uses this guidance to plan and execute the projects that help transform NARA to its target state. Primary participants in this process include the Lockheed Martin Program Director, the Chief Engineer, NARA Enterprise Architects, and NARA Business Representatives.

The process begins with the Enterprise Planning Process, described in the ***2000B Enterprise Planning Process***. This process produces the Enterprise Transitioning and Sequencing Plan that identifies new business capabilities and technology infrastructure to be deployed in each ERA increment and the impact on NARA's organization structure and current systems.

The second phase of the process occurs during ERA Project Execution. Objectives and Desired Business Results (DBRs) from the Enterprise Planning phase are translated into additional system requirements, and capability is built to meet those requirements. Once the capability is deployed, operational performance, and cost data is collected, collated, and submitted for analysis.

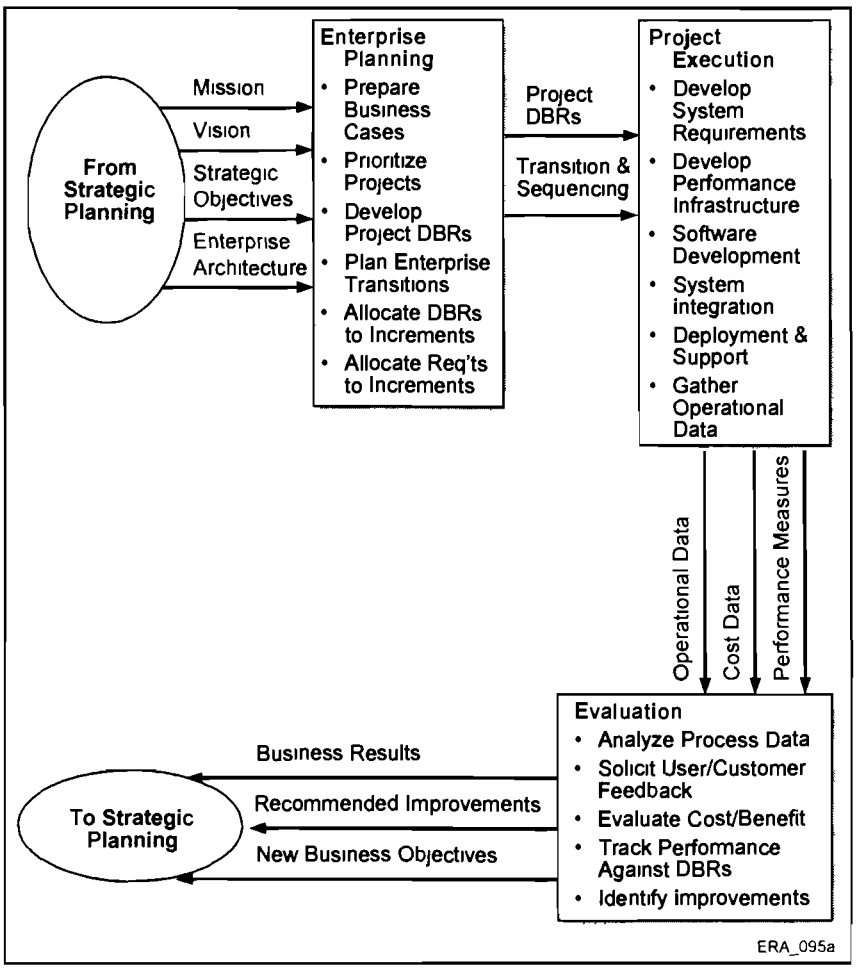


Figure 16–22. ERA Business Value Process

Finally, during the Evaluation phase, the data is analyzed along with feedback from users and customers. The increment's cost/benetit is evaluated on its own and in the context of earlier ERA increments. Actual business performance results are tracked against the DBRs and new business objectives and process improvements are recommended for the next iteration of Strategic Planning.

2000B Enterprise Planning Process

The Enterprise Planning Process, illustrated in Figure 16–23, Enterprise Planning Process, is part of the ERA Business Value Process described in the ***2000A ERA Business Value Process***. Enterprise Planning uses the outputs of Strategic Planning and is responsible for the ERA-related content of the Enterprise Transitioning & Sequencing Plan, which in turn is part of the Enterprise Architecture. Primary participants in this process include the Lockheed Martin Program Director,

the Chief Engineer, the NARA Chief Architect, NARA Enterprise Architects, and NARA Business Representatives.

Using the Enterprise Mission, Vision, Strategic Objectives, and the Enterprise Architecture, the Enterprise Planning Process develops project plans for ERA. The process starts by analyzing alternatives and developing business cases for each. Selected projects are then prioritized using guidance from the Strategic Plan, budgets and funding outlooks, and key organizational and technical dependencies within ERA and other programs. Project-level DBRs are established and results are incorporated into the Integrated Master Schedule.

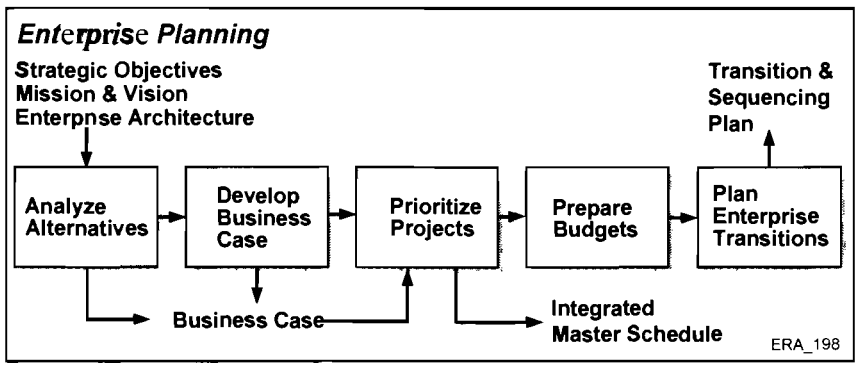


Figure 16–23. Enterprise Planning Process

Budgets are then created for each prioritized project with greater detail going into near-term projects. Finally, the Enterprise Transition and Sequencing Plan is updated and provided as guidance and requirements for project execution.

2000C Architecture Description Process

The ERA Architecture Description Process is illustrated in Figure 16–24, ERA Architecture Description Process. The ERA architecture is captured in a set of documentation as the result of several architecture development activities. The inputs to this process are the operational concept documents, including both the NARA operational concept document and the System Concept of Operations (ConOps) developed as part of the System Analysis and Design phase, the system requirements developed in the System Requirements Specitications (SyRS), and the external interfaces.

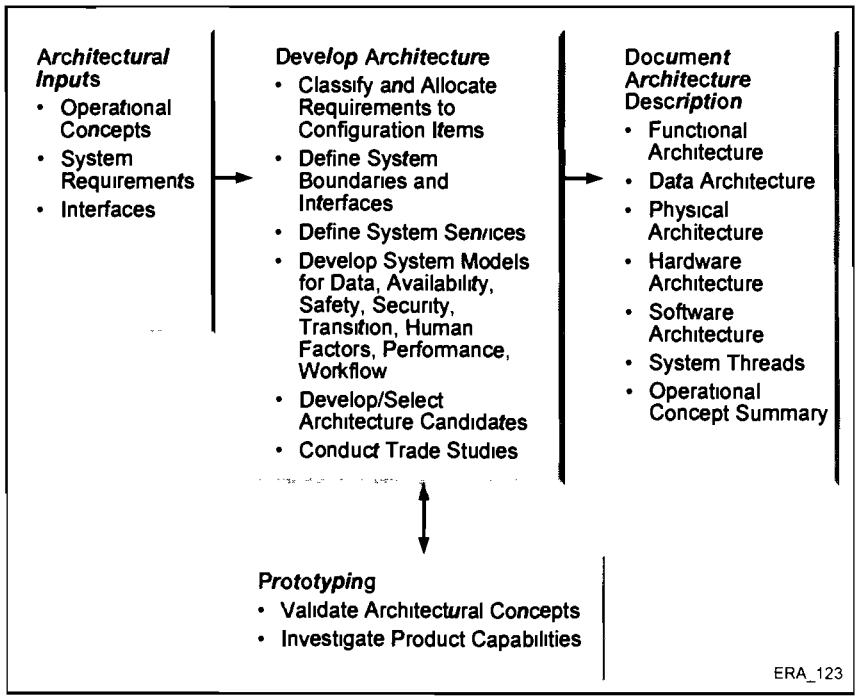


Figure 16–24. ERA Architecture Description Process

The architecture is derived from a categorization and allocation of requirements and system services to configuration items. The service definition is used to ensure our architecture is consistent with the NARA enterprise-level architecture. The system boundaries and interfaces are defined. Functional, data, and physical architecture candidates are documented. A series of modeling activities are conducted in support of the system architecture definition and preferred candidate selection, ranging from data models to performance and workflow, to validate its operation across all of the system constraints. Trade studies are performed to select the preferred architecture candidate and refine various portion of the architecture. Prototyping will also be used to validate architecture concepts by coding or integrating technology elements that represent difficult or critical aspects of the architecture.

The essential aspects of the system architecture are defined in the System Architecture Description document. It contains operational concept summaries, functional, data, physical, and software architecture views, and system threads. The various architectural views are mapped onto each other. Software elements are mapped onto hardware platforms, services to functions, and functions to hardware and software configuration items. This document forms the baseline for software and hardware design.

2000D Evolution Planning Process

The ERA Technology Validation process is described in ***2000E Technology Validation***. It addresses the process used to develop research and commercial marketplace information and assessment data relevant to the development of the evolution plan. The Evolution Planning Process is shown in Figure 16–25, ERA Evolution Planning Process.

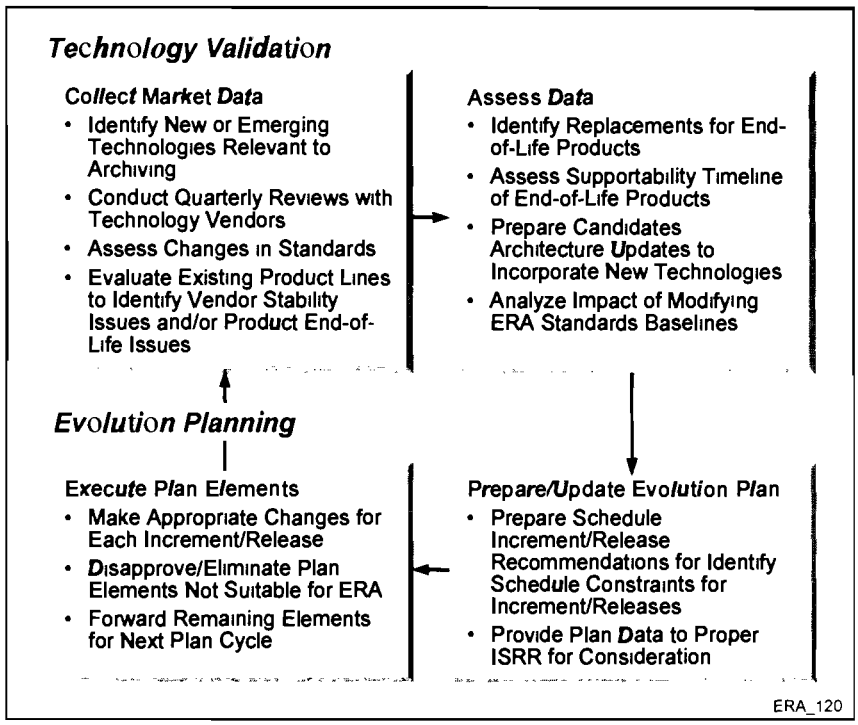


Figure 16–25. ERA Evolution Planning Process

The assessment data developed as part of the technology validation process is used to prepare an evolution plan. An increment and release are recommended for technology insertion or product upgrade. The recommendation takes into account the size and complexity of existing drops, total cost of ownership, the maturity of the technology, and the urgency of the change. This plan is presented to NARA for use in the next Systems Requirements Review (SRR).

NARA and the Lockheed Martin Team review the content of the evolution plan jointly. Based on this review, items may be implemented in a particular increment/release, dropped from further consideration, or fed back into the next technology validation cycle. This feedback forms the basis for the next round of market data collection. Products and technologies may be carried in the evolution plan for some time until they reach a level of maturity consistent with NARA's risk profile and demonstrated acceptance in the commercial marketplace.

In the event of rapidly changing events in the commercial marketplace, particularly instability of a vendor or reaching end-of-life of a critical product used by the ERA system, additional cycles of the above process may be conducted. These additional cycles are specific to the vendor or products in question. Status on these types of issues is provided in regular program status meetings and on an exception basis as necessary.

2000E Technology Validation Process

The Technology Validation Process generates information and assessment data on changes in technology, standards, and company and product status over the life of the ERA contract for use in evolution planning. Evolution planning is addressed in paragraph ***2000D Evolution Planning Process***. Vendor relationships are leveraged to identify new and emerging technologies relevant to electronic data archiving. Searches of commercial product capabilities to address changing

NARA requirements are conducted by the engineering team. In addition, our team leverages relevant research and development activities conducted by our companies and in academic circles. We conduct quarterly reviews with key technology vendors, researchers, and NARA to review new technologies, research, and product line plans. On an ongoing basis, the stability of commercial product suppliers and the status of particular products in the ERA design are assessed to make sure these products are going to continue to be available. Changes to widely used commercial standards are assessed and reported on by our team at the quarterly reviews.

The technology and standards information collected is assessed based on their maturity, cost of ownership, and projected usefulness to ERA. We balance the value of newly introduced products and research activities with the stability of the technology. In many cases, the tirst few years of a technology are exposed to a great deal of instability that may not be suitable for the risk protile that we want to establish with NARA for the ERA. The effort is focused most heavily on those aspects of the system where new requirements are emerging or current technology is facing obsolescence.

2000F The Life Cycle Cost Process

The Life Cycle Cost process is illustrated in Figure 16–26, ERA Life Cycle Cost Process. The Lockheed Martin Team maintains the ERA Life Cycle Cost (LCC) estimate in accordance with the data elements described in Attachment 13 to Section J, Cost Element Structure Data Dictionary (CEDD) and Attachment 14 to Section J, CDRL Data Item Descriptions and Guidelines. ACEIT is used to produce the required Microsoft Excel output formats as well as a runtime module and data set that will allow the ERA Program Management Office to perform independent scenario-based evaluations, sensitivity analyses, and budget projection analyses.

An electronic and hard-copy version of the LCC estimates will be provided to the ERA PMO nine months from contract award. The LCC estimate documents all bases of estimates, assumptions, ground rules, constraints and methodology associated with the LCC estimate. The format identifies costs in each cost element on a yearly basis through 2020 and provides sheets that sum the totals of subordinate cost elements at each level.

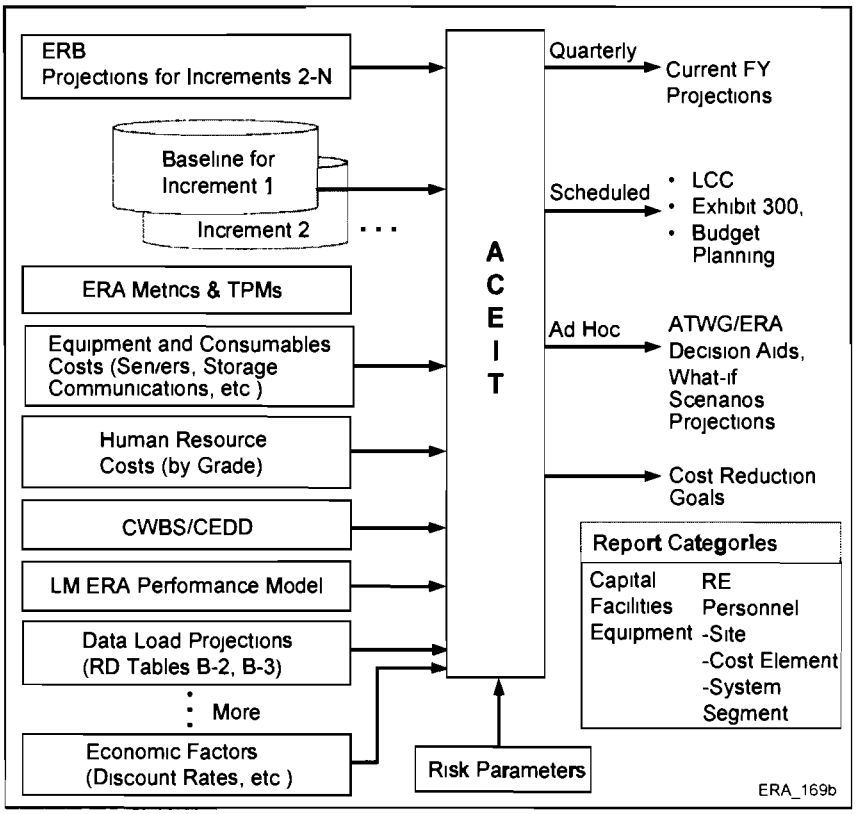


Figure 16–26. ERA Life Cycle Cost Process

The initial task of an LCC analysis is to define the analysis boundaries such as the relevant requirements set, the design options, key assumptions such as site conditions or availability of Government furnished equipment, specific analysis priorities, and any scheduling or funding constraints. The information is used to focus the LCC effort on the cost data requirements and metrics needed to measure cost effectiveness relative to the stated analysis conditions and priorities.

The Lockheed Martin Team identifies major cost drivers from model runs in support of requirements and design reviews for each increment and release. As the ERA design and integration process matures, the cost drivers, particularly the Operations and Support (O&S) cost drivers, will change and will influence design choices in different ways. This key cost information will be given to the designers to maintain feedback to ERA design of LCC. Each cost element of ERA will be displayed in the costs results with each phase computed separately so its research and development, production, O&S, and disposal cost will be identitiable. Thus, as the design becomes more detailed, the level of cost drivers will also become more detailed.

A baseline Life Cycle Cost Estimate (LCCE) was established during the ERA Proposal activity. The proposal LCCE will be updated at the beginning of the program (for the System Requirements Review) and will become the program LCC baseline. Cost reduction goals will then be established and applied to determine a target LCCE for future milestones. As the subsequent design reviews approach, the team uses the recomputed LCCE as the new estimate baseline, and new goals are levied on the engineering teams.

3000 System Engineering, Integration and Test

The ERA systems engineering processes provide a rigorous, well documented, and proactive approach to conducting requirements analyses, performing functional analyses, allocating performance requirements, synthesizing design solutions, performing systems analysis and trade studies, verifying compliance with requirements, integrating and testing the developed solution, and transitioning to operations. Our systems engineering process applies to all Lockheed Martin Team members and subcontractors. The processes have, at their foundation, a core set of engineering methodology standards and procedures that are further defined in the ERA Systems Engineering Management Plan (SEMP) that supports horizontal integration of all engineering activities across the organization. The SEMP documents a single lifecycle approach to systems engineering and integration for both development and follow-on sustainment activities by defining, refining, and maintaining core engineering principles, practices, processes, standards, and conventions to be used across the ERA program.

3000A Formal Requirements and Design Review Process

For each major delivered system release, the Lockheed Martin Team leads and coordinates the conduct of requirements and design-related formal reviews, including System Requirements Reviews (SRRs), Preliminary Design Reviews (PDRs), and Critical Design Reviews (CDRs). Responsibilities of the Lockheed Martin Team for each of these major reviews include:

- Coordinating the meeting agenda with the NARA;
- Delivering advance copies of the review material;
- Conducting the review meetings; and
- Preparing meeting minutes and action items.

NARA's responsibilities for each of these major reviews include:

- Influencing the content of review material during ongoing participation in IPTs:
- Approving the agenda;
- Inspecting and commenting on review materials; and
- Documenting and, jointly with the Lockheed Martin Team, agreeing on issues and actions items collected from the meetings.

Issues and action items are captured from each meeting, reviewed and agreed to by both NARA and Lockheed Martin. Action item resolution is tracked in the Lockheed Martin Team's engineering Critical Thread Reviews (CTRs) and Monthly Status Reviews (MSRs). The engineering CTRs and Program Management reviews also provide the forum in which team leads ensure consistency of action item resolution between the various reviews.

As shown in Table 16-11, ERA Lifecycle Phases, Reviews and Anticipated NARA Participation, for each review, the Lockheed Martin Team produces specific lifecycle documentation that provides the objective evidence that Integrated Plan event activities and accomplishment criteria have been fully satisfied for the various levels of NARA review participation. All of this information is maintained in the Integrated Plan and Integrated Schedule for the ERA program.

Table 16–11. ERA Lifecycle Phases, Reviews and Anticipated NARA Participation

ERA Lifecycle Phase	ERA Program Reviews, Mapped to Anticipated NARA Participation (R) review, (P) participate, (O) observe, (L) lead									Lifecycle Documentation √ indicates a software document
	SRR	SDR	PDR	CDR	TRR	ORR	FAT	PAT	FCA/ PCA	
Analysis and Design	P	P	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Interface Control Documents (ICDs) Interface Requiremonts Specifications (IRS) Master Test Plan (MTP) System Architecture and Design Document (SADD) System Concept of Operations (ConOps) System Engineering Management Plan (SEMP) System Requirements Specification (SyRS)
Increment 1 Release 1	P	P	P	P	P	L	P	L	L	Common Data Design Specification (CDDS) √ Interface Cnntrol Documents (ICDs) Master Test Plan (MTP) Organizational Change Documentation Security Acereditatiom Documentation Software Design Specification (SwDS) √ System Engineering Management Plan (SEMP) Software Requiremcnts Specification (SwRS) √ Security Risk Assessment Report Training Materials

ERA Lifecycle Phase	ERA Program Reviews, Mapped to Anticipated NARA Participation (R) review, (P) participate, (O) observe, (L) lead									Lifecycle Documentation √ indicates a software document
	SRR	SDR	PDR	CDR	TRR	ORR	FAT	PAT	FCA/ PCA	
Increment 1 Release 2 Increment 1 Release 3 Increment 2 Release 2 Increment 3 Release 2 Increment 4 Release 2	P	P	P	P	P	L	P	L	L	Common Data Design Specification (CDDS) √ Interface Control Documents (ICDs) Organizational Change Documentation Security Accreditation Documentation Security Risk Assessment Report Software Requirements Specification (SwRS) √ Software Design Specification (SwDS) √ Training Materials
Increment 2 Release 1	P	P	P	P	P	L	P	L	L	Common Data Design Specification (CDDS) √ Interface Control Documents (ICDs) Organizational Change Documentation System Concept of Operations (ConOps) Security Accreditation Documentation Security Risk Assessment Report Software Design Specification (SwDS) √ Software Requirements Specification (SwRS) √ Training Materials

ERA Lifecycle Phase	ERA Program Reviews, Mapped to Anticipated NARA Participation (R) review, (P) participate, (O) observe, (L) lead									Lifecycle Documentation √ indicates a software document
	SRR	SDR	PDR	CDR	TRR	ORR	FAT	PAT	FCA/ PCA	
Increment 3 Release 1 Increment 4 Release 1 Increment 5 Release 1	P	P	P	P	P	L	P	L	L	Common Data Design Specification (CDDS) √ Interface Control Documents (ICDs) Organizational Change Documentation Security Accreditation Documentation Security Risk Assessment Report Software Design Specification (SwDS) √ Software Requirements Specification (SwRS) √ System Concept of Operations (ConOps) System Evolution Plan Training Materials

3100A Systems Engineering Process

The Systems Engineering (SE) process is illustrated in Figure 16–27, ERA Systems Engineering Process. For ERA, the SE process is detailed and amplified in the tailored ERA Systems Engineering Management Plan (SEMP).

- Needs Definition and Concepts Exploration. Our engineering team has already begun the Needs Definition and Concepts Exploration process through analysis of the NARA RFP mission statement, operational concepts, NARA enterprise architecture, requirements document, and policy and guidelines; and will continue to explore the operational system needs and system constraints with NARA during the Analysis and Design phase.
- Requirements and Interface Analysis. During the Analysis and Design phase, we analyze, record, and derive requirements necessary to make the ERA system successful including detailed interface information.
- System Architecture. An initial system architecture is developed that captures the system context, operational concepts and scenarios, and defines candidate system architectures in order to provide context for the requirements review.
- Requirements Review. A System Requirements Review (SRR) is conducted with NARA to ensure complete understanding of the system requirements. In particular, the System Requirements Specification (SyRS), Interface Requirements Specifications (IRS), and presentations on a broad range of engineering disciplines (e.g., availability, performance, human factors, etc.,) are reviewed at SRR.
- ERA Enterprise Design. An ERA enterprise design is developed to ensure that our architecture framework is consistent with the NARA enterprise model.
- System Analysis and Modeling. Technical risks and various performance models of the system are identified and developed, including computer performance and reliability, maintainability, and availability. These form the basis of our technical performance measurements and trade study activities.
- Conceptual Data Model. Development of a conceptual data model is initiated.
- Workflow Analysis. Workflow analysis is performed, to capture the current NARA workflow and to identify the appropriate "to be" workflow for ERA.
- Trade Studies and Prototyping. Trade studies are completed to compare multiple technical solutions and validate the capabilities of commercial products. Prototyping results are key elements of trade studies and form the basis for concept validation in future prototyping activities.
- System Design. During system design, architectural segments are defined that allocate requirements into semi-independent system parts. Then a summary operational concept is completed, functional, and physical architectural views are prepared, system threads/use cases are defined, and initial software and hardware architectures are developed. This information is captured in the System Architecture and Design Document (SADD), Interface Control Documents (ICDs), and a functional plan that spreads the development effort by increment and release. This documentation forms the basis for the System Design Review (SDR).
- Test Planning. The Master Test Plan (MTP) is developed in parallel with system design and presented at the SDR.

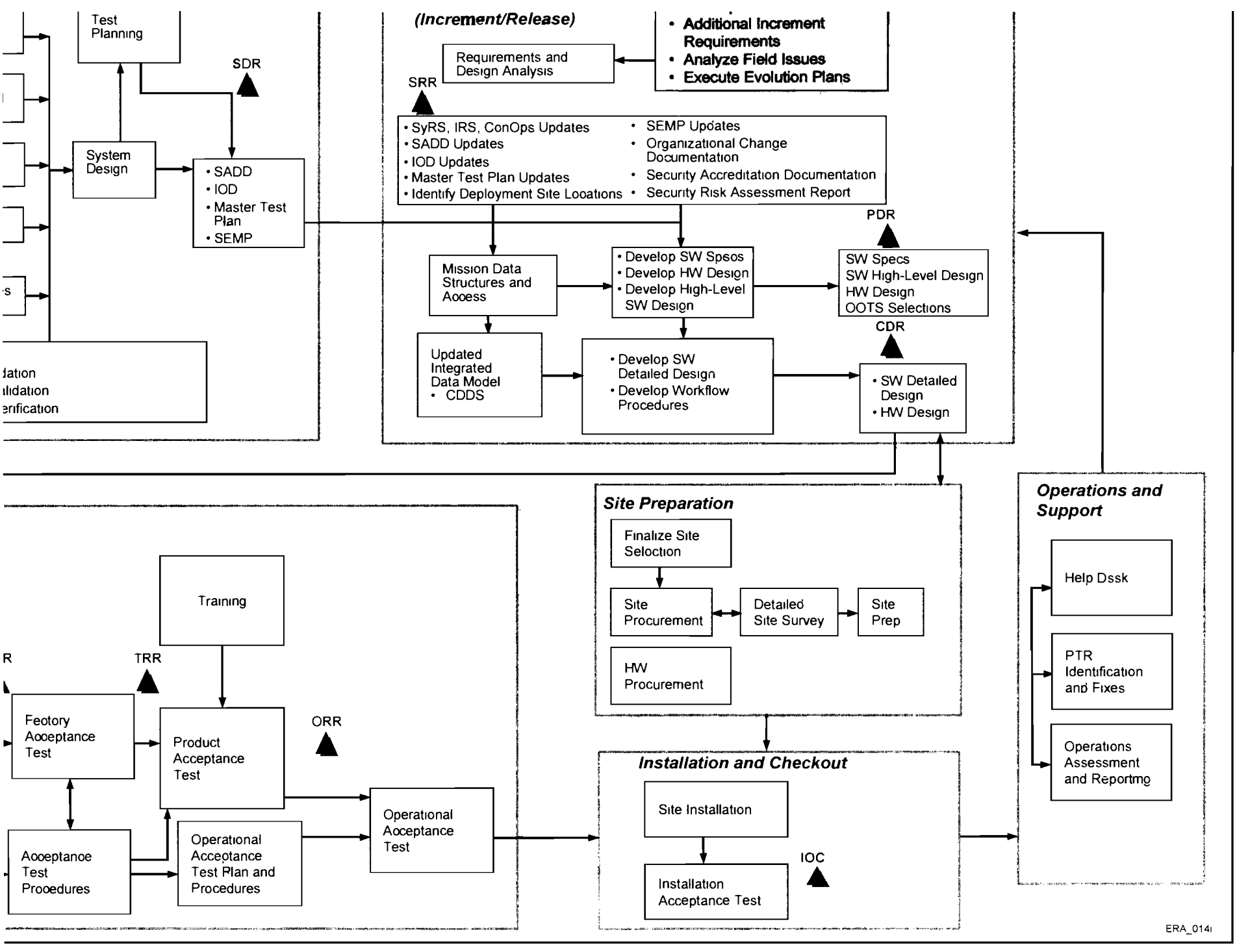


Figure 16–27. ERA Systems Engineering Process

At the beginning of each increment, the above process steps are repeated to address inputs received from NARA on new requirements, tield issues, and the execution of evolution plans. Updates to the Analysis and Design phase (or previous increment) are prepared. Then the system engineering process for the increment/release plan is initiated. We perform this process by:

- **High** Level Software and **H**ardware Design. Software requirements specifications are developed based on the allocation of requirements to the computer software configuration items detined in the SADD. Hardware elements are designed as needed, including the racking design for commercial equipment.
- **M**ission Data **Structures** and Access. Mission data structures and data access rules for the system are defined.
- Preliminary **D**esign **R**eview (PDR). A PDR is conducted on the software and hardware designs, and COTS product selections. Issues from the PDR are resolved in close cooperation with NARA and addressed in the detail design activities

Issues from the preliminary review are resolved in close cooperation with NARA and addressed in the detail design activities, including:

- **D**etailed **D**esign. Detailed software designs and workflow procedures are developed.
- **U**pdated **I**ntegrated Data **M**odel. The Integrated Data Model is updated to capture the data dictionary for each data element in the system; and
- **C**ritical **D**esign **R**eview (**CDR**). Incremental CDRs are conducted on each system element prior to initiating implementation.

Audits are performed internally to assess the state of the overall System Engineering activity. Customer PCAs and FCAs are supported as needed.
The remaining lifecycle processes for Implementation and Test, Site Preparation, Installation and Checkout, and Operations and Support are described in their respective narrative sections of this Integrated Plan.

3100B Technical Performance Measurement Process

Concurrent with the technical planning, the product teams, Systems Engineering and Architecture Groups, and the ERA Chief Engineer will identify candidate Technical Performance Measurements (TPMs) to assess product effectiveness. TPMs are selected to span the life of the function, subsystem, or product characteristic being measured. Each TPM measures a performance item through analysis, test, demonstration and/or simulation and has a required value and assigned design margins. TPMs may be appropriately altered by changes to the system design or its requirements. TPMs will be selected during the Analysis and Design phase and each increment thereafter.

In order to track program technical performance in a satisfactory manner, TPMs are selected to satisfy the needs of both the Lockheed Martin Team and NARA. The selection process uses the following criteria to choose TPMs.

- A TPM must have at least one of the following three properties:
  1. It is a high-order performance driver.

2. It is a driver for a key interface.
3. It is a measure of critical resource usage.

- A TPM must have all of the following characteristics:
  1. **Risk-related.** A TPM which is volatile or whose value exceeds preset margins may be elevated to a program risk.
  2. **Technical.** A TPM is derived from system functional performance requirements.
  3. **Measurable.** A TPM must be able to be cast in a non-subjective, quantifiable context.
  4. **Dynamic.** A TPM value must be able to be controlled by the design, and driven toward a target value.

The TPM list can be modified at any point during the remainder of the program to reflect current technical concerns or changes in requirements. The TPM process is illustrated in Figure 16–28, ERA TPM Process.

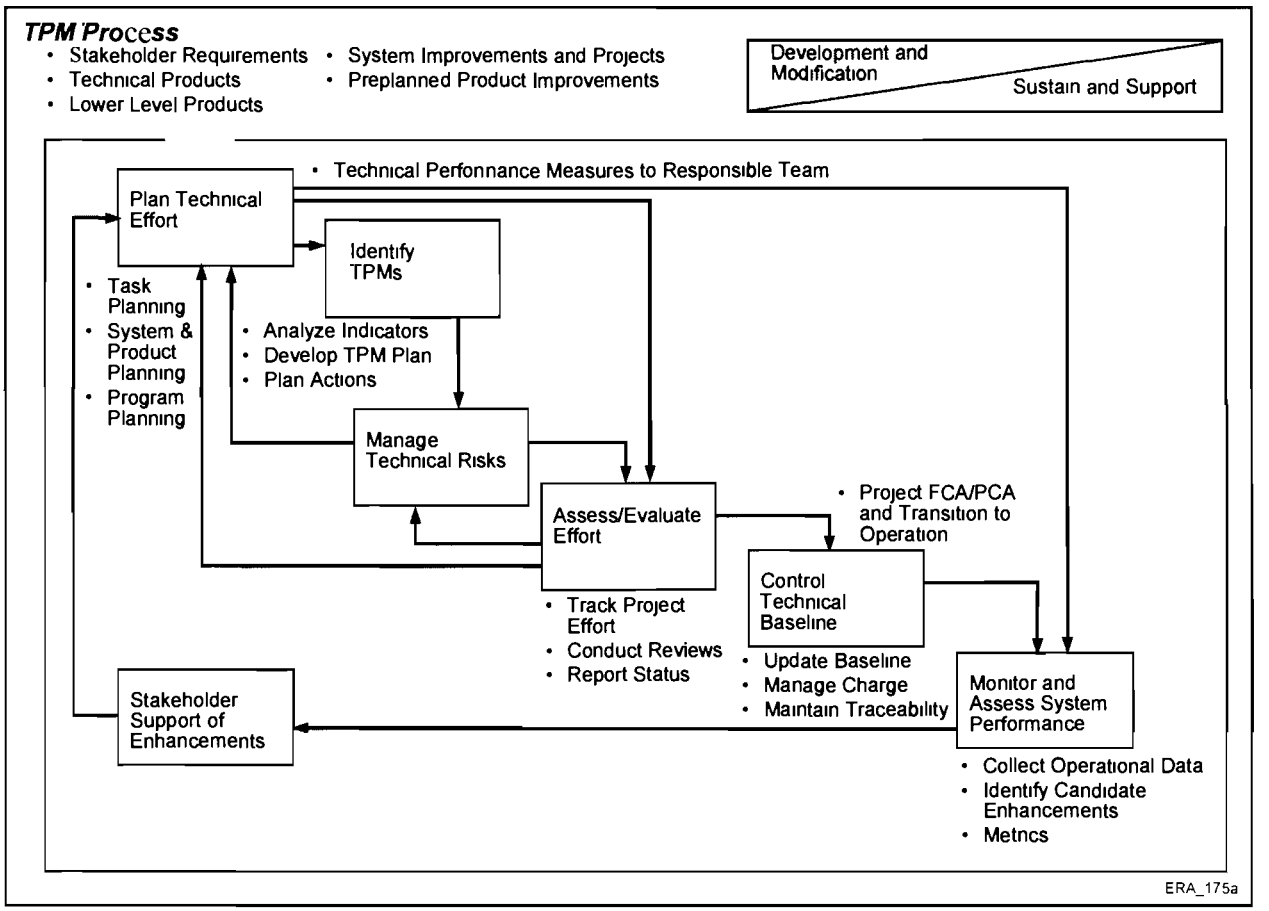


Figure 16–28. ERA TPM Process

A TPM Plan is developed for each TPM by the responsible IPT. The TPM plan contains several key elements including its scope, the measurement approach, and a time-phased plan profile. The plan for each TPM is under the control of the IPT that is assigned responsibility for that TPM. The IPT is responsible for the development and revision of the elements in the plan.

TPMs are usually expressed as graphical representations of the parameter values versus time. In implementing TPMs, there are four values of measurement:

- **Planned Value.** The planned value is the anticipated value of a parameter. When changes are expected during the development cycle, a plot of these versus time is known as the "planned value profile."
- **Demonstrated Value.** The demonstrated value of a parameter is the value estimated or measured in a particular test or analysis, or both.
- **Current Estimate.** The current estimate is the value of a parameter predicted for the end product of the contract.
- **Specification or Target Value.** The value or range of values contained in a contractual performance specification at that point in time.
- **Technical Variance.** There are two technical variances. Demonstrated variance is the difference between a demonstrated value and the corresponding planned value. Predicted variance is the difference between a specification requirement and the current estimate for the end product.

IPT leaders are responsible for monitoring and reporting the TPMs for their products. The following analysis functions for each assigned TPM would be accomplished:

- Perform, document, and review identified analyses, demonstrations, tests, and reports;
- Enter the change in status of the TPM in EDMS within a week of the change;
- Report the cause of any idenfified deficiencies;
- Develop recovery plans as necessary addressing cost, schedule, performance, and risk impacts;
- Identify and resolve, or elevate issues in a timely manner; and
- Prepare material and support status and design reviews as required.

The process of updating and maintaining the TPM list must be flexible to program changes, including changes in mission requirements or design alterations. As a result of such changes, it may be necessary to add, delete, or retire TPMs if it is necessary in the new context. In the case of a currently exisfing TPM that is no longer applicable, it may be considered for deletion from the TPM list. Any TPM list changes must be appropriately identified, proposed, and approved by the ERA Chief Engineer.

The main impetus behind the TPM process is to ensure compliance with system performance requirements. The risk and TPM processes work independently, yet have a strong association that brings technical program problems to light. The risk mitigation lead should routinely observe the TPM list for values that exceed specified margins. If a TPM surpasses its margin by a pre-determined amount, the appropriate subsystem or interface associated with the TPM may be elevated to a program-level risk

3100C Trade Study Process

Trade studies are widely used on the ERA program for technology selection (both hardware and COTS software components, methodologies, and tools), architectural decisions, and resolution of critical design issues. The trade study process, shown in Figure 16–29, Trade Study Process Flow, provides a framework for making these selections and decisions using a formal process

that evaluates identified alternatives against established criteria. These criteria provide the basis for the evaluation and are ranked so that the highest ranked criteria exert the most influence on the evaluation.

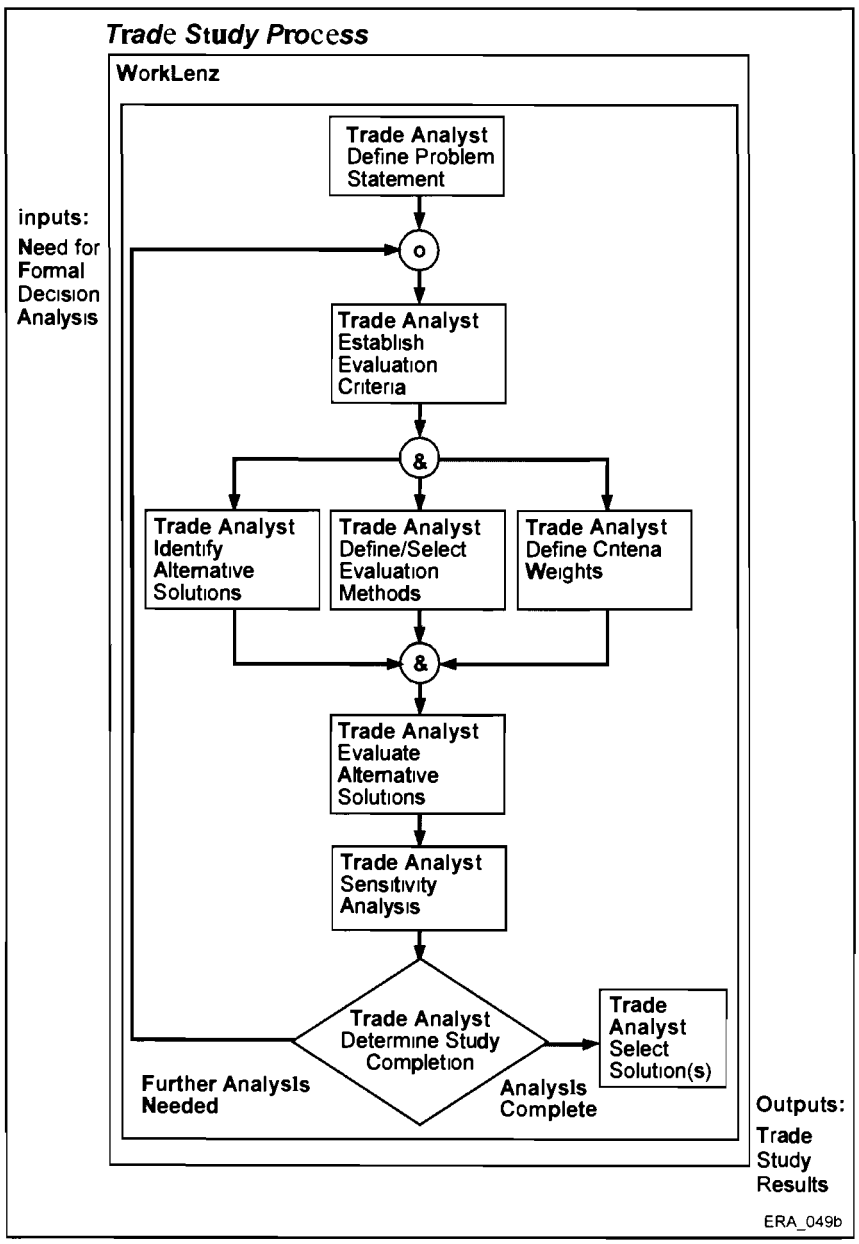


Figure 16–29. Trade Study Process Flow

Steps in the process include:

- **Define the Problem.** The Trade Analyst defines and documents the purpose, objective(s), constraints, and requirements of the trade study, including definition of the need, the user, and the availability of resources bounding the scope of the analysis. Without a clear statement, studies become costly and produce unclear results.

- **Establish Evaluation Criteria.** The Trade Analyst establishes, documents, and maintains the criteria for evaluating alternatives, and the relative ranking of these criteria.
- **Identify Alternative Solutions.** The Trade Analyst identifies and documents alternative solutions to the problem.
- **Define/Select Evaluation Methods.** The Trade Analyst selects, defines, and documents the methods for evaluating the alternative solutions against the established criteria. The Trade Analyst also ensures that the selected evaluation methods are commensurate with the resources bounding the scope of the analysis.
- **Define Criteria Weights.** The Trade Analyst defines and documents weighting factors for the evaluation criteria.
- **Evaluate Alternative Solutions.** The Trade Analyst evaluates alternative solutions using the established criteria and methods, and documents these evaluations.
- **Sensitivity Analysis.** The Trade Analyst determines the sensitivity of the solution ratings to small changes in input values.
- **Determine Study Completion.** The Trade Analyst determines study completion by ascertaining whether the analysis is complete and sufficient to permit solution selection or whether further analysis is needed.
- **Select Solution(s).** The Trade Analyst selects a solution(s) from the alternatives based on the evaluation criteria, and documents the rationale for this selection.

This formal evaluation process reduces the subjective nature of the decision and has a higher probability of selecting a solution that meets the multiple demands of the relevant stakeholders.

3100D Peer Review Process

The Peer Review Process is used internally to review new or modified ERA work products to detect defects or discrepancies. The author prepares an inspection package, including the work product and supporting material, and distributes it to a set of inspectors. The inspectors review the work product, noting defects and issues. These defects and issues are collected and discussed at an inspection meeting, chaired and led by a moderator. Alternatively, where appropriate (typically for minor modifications), a pass-around inspection is held, where the inspectors transmit their review comments to the moderator for collation, analysis, and recording, and no meeting is held. The author then revises the work product to correct any defects detected and this rework is verified by the moderator. The moderator may require a re-inspection of the corrected work product or may close the inspection.

Throughout, the moderator records data on the performance of the process (defects detected, effort expended, etc.,) in an inspection database. Figure 16–30, Inspection Process Overview, provides an overview of the process.

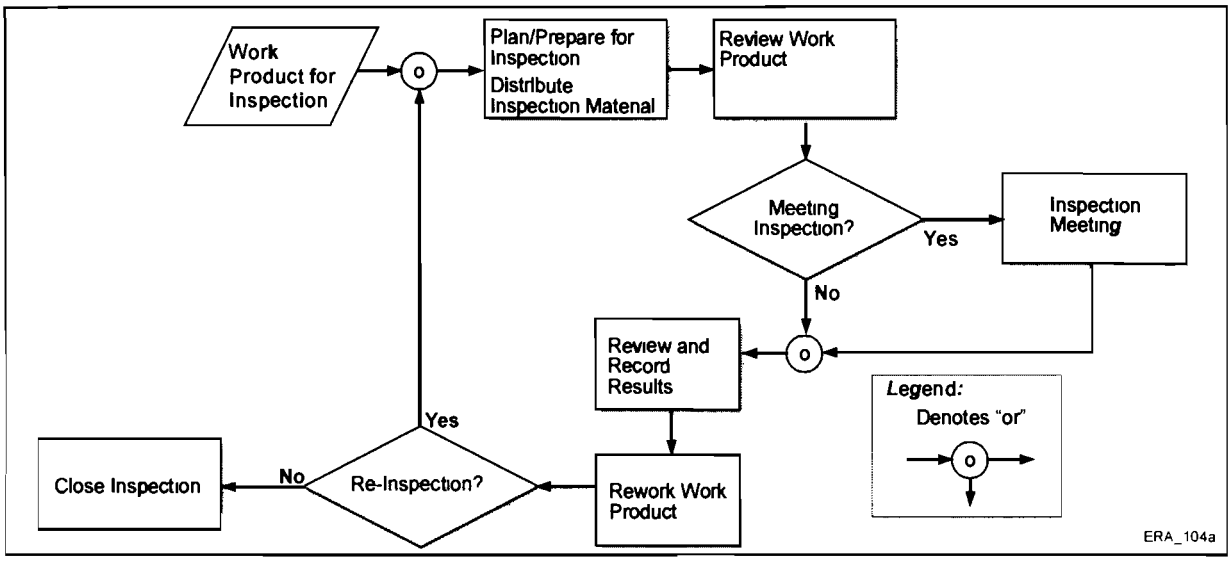


Figure 16–30. Inspection Process Overview

3100E RMA Process

The Reliability/Maintainability/Availability (RMA) process addresses the activities needed to meet ERA program RMA contract requirements. Process tasks include:

- Develop the program RMA plan to identify the tasks needed to meet program RMA requirements and allocate program resources to their performance. The RMA plan is captured in the System Engineering Management Plan (SEMP).
- Quantitative system RMA requirements are allocated to lower level assemblies or sub-assemblies, so the composite system RMA remains within the specification requirement. Reliability allocations are reported in a Reliability Prediction Report and submitted to the customer when required.
- Develop RMA performance estimates by developing RMA models and tailor ERA system-specitic prediction algorithms to evaluate the proposed system concept and determine whether the desired RMA can be attained.
- Perform design analysis to assess the extent to which the design of the ERA system supports acceptable positive RMA design margins in a cost-effective manner.
- Perform Failure Mode and Effect Analysis/Failure Mode and Effect and Criticality Analysis (FMEA)/(FMECA) analysis to identify possible system failure modes and documents all possible failures in a system design. This workproduct is used to establish, by failure mode, the effect of each failure on system operation and identify single point failures. RMA ranks the failure mode scenarios according to the criticality category of failure effect and probability of occurrence.
- RMA engineers translate data from ERA studies, engineering reports, and detail design sources to provide RMA analysis, predictions, and inputs to the maintenance and support planning to improve spares levels requirements, scheduled maintenance cycles, and maintainability of the tielded ERA instances.
- A closed loop failure reporting and corrective action system (FRACAS) is established and documented with procedures to determine causes of failure and to document corrective actions. A Failure Summary Report, which documents all failures and

corrective action, is submitted to the customer, as required by the contract or as outlined in the RMA Program Plan.

3100F Vanishing Vendor Process

The Vanishing Vendor Process analyzes and resolves problems involving diminishing sources of manufacture, materiel, and repair support and equipment obsolescence. A lead logistics specialist and supporting personnel are assigned to research the complete listing of ERA equipment on a recurring basis for Vanishing Vendor problems.

Initially, the process focuses on identifying and mitigating single points of failure that may involve Vanishing Vendor items of equipment. The Vanishing Vendor Team also receives notices from vendors of any intent to discontinue support as well as Diminishing Manufacturing Support – Material Shortage Notices generated by the Government Industry Data Exchange Program. In the case of equipment obsolescence, the engineering or maintenance activity that identifies the particular issue notifies the Vanishing Vendor team.

When an item is projected to cause a Vanishing Vendor problem, the team, working with other ERA program engineers and maintenance specialists, searches for alternate sources of supply, or if none is found, attempts to identify a form, fit, and function replacement. Where appropriate to ensure adequate support for the projected life of an item, the team recommends a quantity buy from remaining vendor stocks of components projected to become in short supply, based on in-service usage and reliability data for the component. In the case of obsolescent equipment, the team works closely with the appropriate engineering disciplines to locate a commercially available form, fit, and function replacement. If none is available, the Vanishing Vendor team recommends engineering action to replace the item with a new, supporTable 16esign.

The Vanishing Vendor Team conducts periodic reviews of equipment/component baselines to identify Vanishing Vendor items before they impact mission performance. The team also interacts with other program teams to ensure that no potential Vanishing Vendor items are introduced by new product acquisitions or modifications. Potential Vanishing Vendor problems and possible solutions are presented to the ERA customer during monthly status meetings.

3100G Software Engineering Process

Software development and software maintenance activities on the ERA program are performed following a comprehensive set of processes for transforming the ERA software architecture definition and associated software requirement specifications (ERA Software Requirement Specification and Interface Requirement Specification) into an integrated software system implementafion meeting the ERA System Requirement Specification. Where possible, specifications are implemented using COTS software components, following the ***31001 COTS Software Process***, or by reuse or adaptation of existing Lockheed Martin software components following the Engineering Non-Development Item (NDI) Process. Where original development is required, software engineering involves three phases, each governed by a corresponding process: software high-level design, software detailed design. and software development and test.

During initial system specification, the software design process is entered when Computer Software Configuration Item (CSCI) requirements are allocated and the software architecture is

stable. Later in the development cycle it may be re-entered to assess the impact of a change request or problem report and, if necessary, make corrective design changes.

The high-level design phase extends the CSCI software architecture that was defined during system design down to the Computer Software Component (CSC) level to produce implementation specifications for the software.

During the high-level design phase, the final decomposition into implementable units begins. CSCs are determined and major/critical components identified. Performance concerns for critical paths are identified and tracked to ensure that the software architecture meets the system performance requirements. Sufficient information may not be available during this phase to determine whether all performance requirements can be met; common shared services, memory requirements, and the eventual target platform may not have been finally determined. In this case a risk mitigation plan is created to track critical performance issues.

In the detail design phase, the software design is refined to show the development of all functional capabilities at the lowest level of detail. This decomposition results in the representation of the data encapsulated by the system, the operations that are performed on the data, and a detailed flow of the operations and data.

Performance allocations are budgeted against the system CSCIs and/or threads. At this point, it may be necessary to modify the design to meet performance requirements and/or memory constraints. The methodology used to measure performance is identified, documented, and verified against the performance requirements.

Programs may choose to deliver functionality in multiple phases. In that case there is a single execution of the high-level design phase, but detailed design may occur multiple times in tandem with software code and test as defined in the Functional Integration Plan.

Development or modification of CSCIs during a build cycle occurs with the reception of a detailed CSCI design/design change/problem report to regression testing of a completed/modified CSCI.

The activities performed include:

- Development, documentation, and inspection of new or modified code, unit test cases, and string test cases;
- Unit, string, and regression testing to verify the developed code; and
- Software Integration Test (SWIT).

3100H Software Maintenance Process

The Software Maintenance Process is activated through one of two mechanisms (1) A problem trouble report (PTR), ***3100K Program Trouble Report (PTR) Process*** (2) A change request, ***3100L Change Control Process***. PTRs are tracked to resolution following the ***3100K Program Trouble Report (PTR) Process***, which addresses the implementation and operation of the

problem tracking system (database, tools, and procedures) that aligns with program requirements and management needs. The activities which comprise the process include:

- Cost the problem management effort and establish initial plans to support the program;
- Establish a means to predict the number of errors in products and measure against those projections;
- Identify, record, and resolve program product problems; and
- Establish standard reports used for communication of problems.

Change requests for software enhancements are evaluated for impact and cost, and tracked to completion following the ***3100L Change Control Process***.

3100I COTS Software Process

The COTS Software Process defines a lifecycle for the management of commercial off-the-shelf (COTS) software—also termed Commercially Available Software (CAS)—on the ERA program. CAS management involves multiple disciplines, including Systems, Hardware, and Software Engineering; Integration and Test; Builds and Controls; Product Control; Subcontract and Production Management; Quality Assurance; and Information Services Support. Figure 16–31, CAS Lifecycle Activity Flow, shows the overall process flow of activities during the CAS lifecycle.

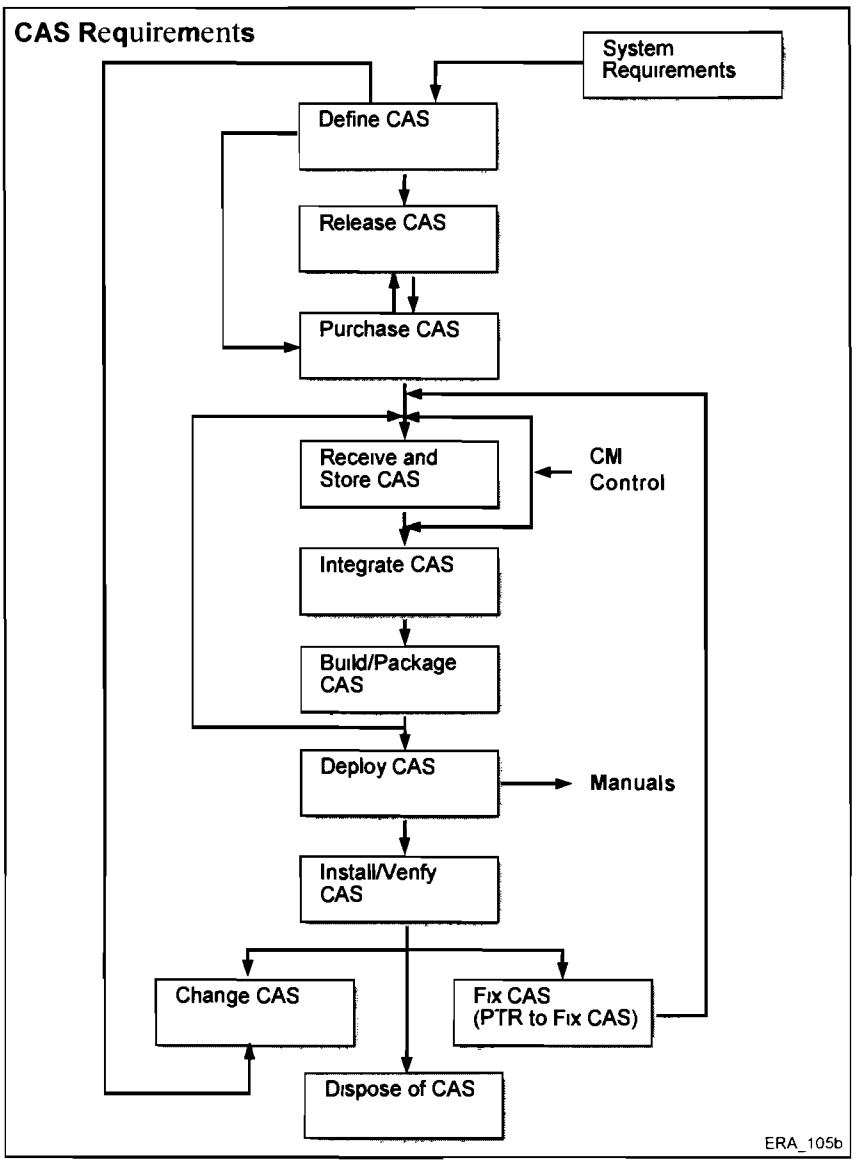


Figure 16–31. CAS Lifecycle Activity Flow

The CAS process terminates at system sell-off. CAS management during a maintenance phase or contract is documented as part of the system maintenance plan.

The CAS lifecycle includes the following activities:

- **Define CAS.** The purpose of this activity is to specify the information that must be collected for each CAS product in the ERA software baseline in order to satisfy product management and procurement requirements. This sub-process is entered initially when the CAS baseline is being defined, and is needed thereafter to manage changes to the baseline.
- **Release CAS.** This activity addresses the steps involved when releasing contract CAS Products. This activity is performed when a program is releasing the program Bill of Materials (BOM).

- **Purchase CAS.** A formal Purchase Request (PR) is generated when program authorization is issued for an approved change request or infrastructure change request, or as a result of a program management directive. Then a new purchase request (PR) is added into the purchasing system or a PR is amended for processing. The PR is then processed through the company purchasing system. This step also ensures that special licensing agreements required for purchase of COTS software for the ERA system are negotiated as part of the purchase.
- **Receive and Store CAS.** This activity addresses receipt of materials from a vendor/supplier, and control of received CAS products (media and documentation) and management of software licenses.
- **Integrate CAS.** This activity creates installable versions of CAS products from controlled media. Integration of CAS software with developed software involves the Product Development Process, the Configuration Management Process, and the Builds and Controls Process. In addition, customization scripts may be developed by the Software development team to implement program requirements.
- **Build/Package CAS.** This activity creates as many new CAS images as are required to support installation of a set of product changes. To minimize disruption caused by new images, product changes may be collected and scheduled for injection at the same time.
- **Deploy CAS.** The purpose of this activity is to provide CAS upgrades/releases for installation.
- **Deploy, Install, and Verify CAS.** CAS releases and upgrades are deployed for installation, and installed and verified at the customer sites. It covers image installations as well as application of formal or informal vendor fixes.
- **Change CAS.** This activity covers upgrade of a CAS version or release, or substitution of a new product in an existing CAS baseline. It does not apply to evaluating trial copies of software. This activity is described in ***3100L Change Control Process***.
- **Fix CAS.** The purpose of this activity is to resolve problem reports that have been opened related to CAS. Either defects in the CAS product or errors in the installation or customization of the CAS product can cause these problem reports. The owner of this activity may not be the problem report owner, but assists in issues requiring vendor interface. This activity is tracked through the ***3100K Problem Trouble Reporting Process***.
- **Dispose of CAS.** This activity addresses project housekeeping for extinct products. Configuration Management and Maintenance determine (subject to any contract requirements) how many back levels of media/documentation should be retained. When that limit is exceeded, the oldest is physically removed and records updated to reflect its purge. The Engineering Change Control Board must authorize the actual deletion. The disposal of CAS is initiated through the ***3100L Change Control Process***.

At program completion or program termination, contract CAS is terminated following applicable property control procedures.

3100J Configuration Management Process

The Configuration Management process consists of five basic tasks shown in Figure 16–32, ERA Configuration Management Activity Model.

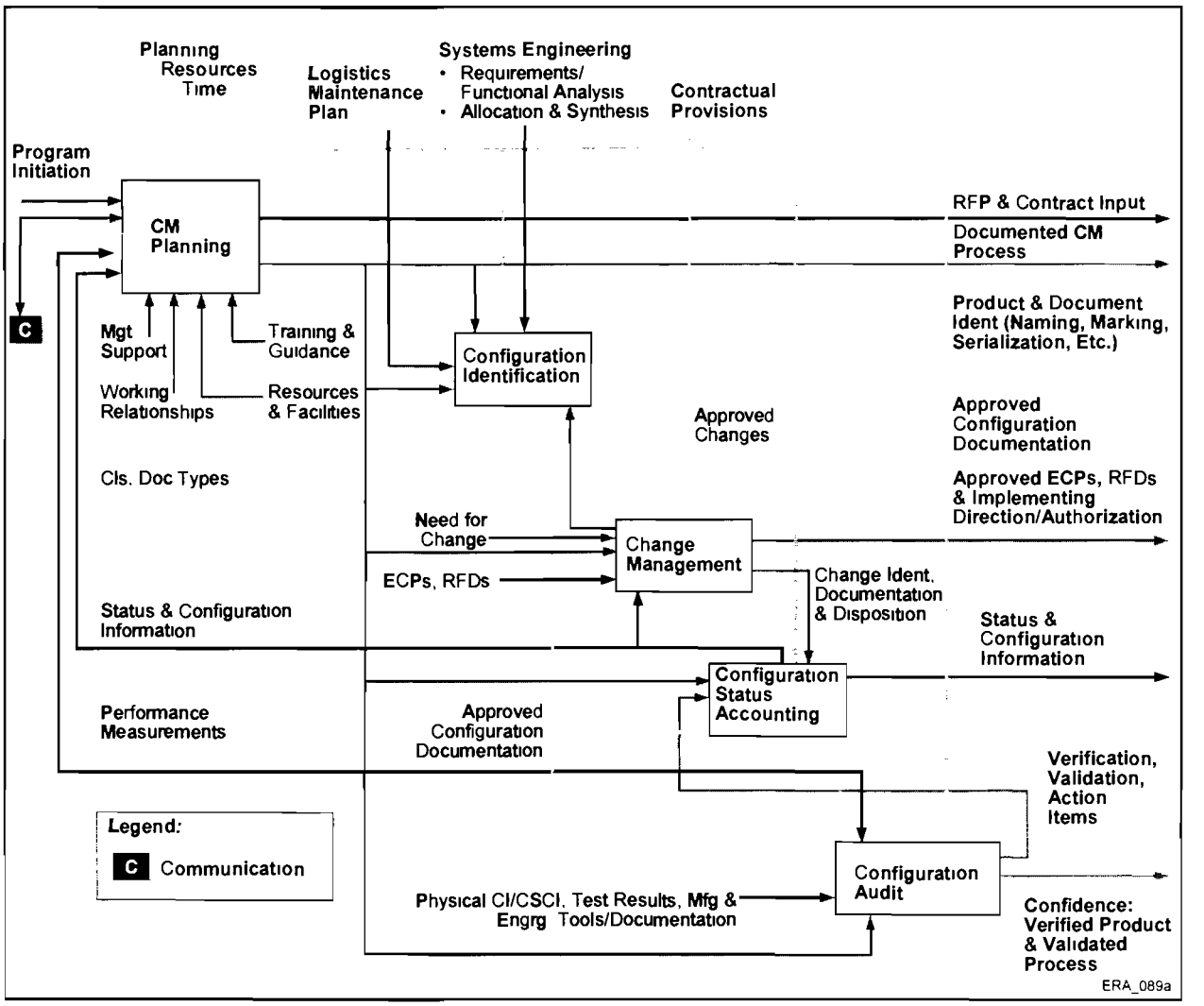


Figure 16–32. ERA Configuration Management Activity Model

These tasks include:

- CM Planning. CM Planning is the first task in the CM Process. CM Planning actually starts during the proposal phase of a project and continues into the start of the contract and beyond. CM requirements are analyzed, an approach to CM is developed, CM budgets are developed, CM personnel and organizational requirements are identified, and the CM Plan (CMP) is developed.

  The purpose of CM Planning is to identify and document the detailed methods and processes by which CM is to be applied to the ERA program. The tailored ERA CM Planning Process and resulting ERA CM Plan describes those processes, methods, and procedures to be used to manage the required functional and physical characteristics of the configured items.

  The process starts by a review and understanding of the contract PWS, CWBS, and

PWBS to analyze customer requirements as they relate to implementing configuration management. The CM tool requirements and structure are established and tailored for the ERA environment. The CM group establishes and documents the CCB and review board processes to include required members. A CM Status Accounting methodology (to include COTS/NDI and GFE/GFI/CFE/CFI) is developed to include the definition of structure and schema required for the ERA program. ERA program CM processes and requirements are flowed down to subcontractors and periodic audits take place to assure compliance.

Once the structure and methodology is in place, hardware, software, firmware, property, and documentation baselines are established in the CM tool. The CM Change control and approval process is established that defines when and how changes to baselines will occur on the ERA program. CM metrics are defined and tracked. Changes in baselines are clearly communicated to stakeholders in a timely manner.

- Configuration Identification. The Configuration Idenfification task starts after contract award during the development phase of the contract. After the contract requirements have been analyzed and allocated, the product structure is defined and the product configuration items (CIs) are identified. The product configuration information required for the product is identified during this task.

  The purpose of Configuration Identification is to define the basis from which the configuration of ERA deliverable or end products is defined, from which validated products and documents are labeled, changes are managed, and product accountability is maintained throughout the lifecycle of the ERA program.

  The process begins by identifying the items and documentation to be controlled. Each item is assigned a unique identification compliant to the schema for hardware, software, and software as required by the CM Plan. Once identified, the CM File Structure and Product Data Libraries are established and populated in the CM tool following the product configuration tree (for example, by product and increment/release) selected for the ERA program. In the CM tool, the configuration and structure of the database are defined to include attributes for COTS/NDI/GOTS/GFE (licenses, version, release baseline, serial number, or key code and ID number). CM identifies any applicable serialization, marking, and security protection requirements for the baseline records and defines the software and labeling and versioning schema for developed software.
- Change Management. The Change Management task starts immediately after contract award and continues throughout the product lifecycle for the duration of the contract. Proposed changes to the approved baseline product configuration information or product configuration must be assessed by the Change Management function for its impact (cost, schedule, and technical scope) on the program. Change Management ensures that only approved changes are implemented, costs and impacts to other program elements are documented, and products and associated documentation remain consistent.

  Configuration Control is the process for managing all changes, variances, and exceptions to an ERA product configuration and baselines. The Configuration Control process assures that impacts of changes are assessed cost, schedule, and technical impacts and

determined to be either containable or not containable within existing contract budget and schedule constraints. Impacting changes are then coordinated with NARA for appropriate mitigation and/or contract changes as required.

The process begins accepting and documenting each request for change, problem report, and request for variance. Changes are idenfified, verified, and then assigned to the appropriate item impacted in the baseline. Each change is evaluated by the affected program management and engineering disciplines as defined in the CM Plan. These disciplines identify and assess all cost, schedule, and technical impacts that will occur as a result of the proposed change or variance (deviation/waiver). An impact/containment assessment is performed for each proposed change that is determined to have a significant impact to program cost, schedule, and/or resources. Each change is processed through the approval and review levels needed to obtain approval (or disapproval) and establish a disposition of each change request. This includes obtaining required CCB and customer approvals and documenting CCB minutes with results of decisions made. Disposition status is provided to all stakeholders through periodic reports and announcements as needed. If approved, updates are made to the CSA records to reflect the change. QA verifies the change implementation in the baseline repository.

- Configuration Status Accounting. The Configuration Status Accounting (CSA) task starts immediately after contract award and continues throughout the product lifecycle for the duration of the contract. CSA is the CM task which provides information about the current status of approved baselines and the progress and status of proposed and approved changes to the design. CSA also covers non-conforming material status reporting.

  CSA is the process and CM toolset used to maintain accurate, timely information about a given ERA product and its product configuration information throughout the product lifecycle. CSA includes the following information:

  — Storage and maintenance of data related to the product configuration information, such as product identifiers and effective dates;
  — Product configuration, such as product identifiers, changes to be or already installed in a given product;
  — Product operational and maintenance information, such as the information affected by each change and their update status;
  — Activity within the CM process, such as the status of change requests; and
  — Records and status of each product non-conformance.

  CSA tasks include entering hardware, software, firmware, and documentation product data (as required) into the CM Tool. Record changes are made to the configuration status as a result of the change management process. To report Configuration Status, products definition/status and baseline configuration reports based on the CSA database in the CM Tool (tailored to meet program specific needs) are generated and made available as required by deliverable and contract requirements.
- Configuration Audit. The Configuration Audit Task is performed during various steps during the product lifecycle. There are three types of configuration audits:

1. Functional Configuration Audits (FCA). The FCA is conducted to assure that tests have been conducted to verify that each requirement in the system-level specification has been met by the design.
2. Physical Configuration Audits (PCA). The PCA is conducted to assure that the product as built matches the approved design documentation.
3. Configuration Verification Audits (CVA). The CVA is conducted on each deliverable producfion item to assure that approved engineering changes are implemented and the associated design documentation is updated to reflect the approved changes. A nonconformance found during an audit or verification shall be documented and tracked to closure.

Audits are conducted to verify continued achievement of requirements, to identify and document changes in performance, and to ensure consistency between the ERA products and their associated documentation. This includes the inspection of product documentation, products, and product records and the audit of processes as well as system of operations to verify that the required product attributes (performance requirements and functional constraints) have been achieved and the design has been accurately documented. CM is responsible for planning and conducting the Physical Configuration Audit (PCA). CM provides input and support to System Engineering in the Functional Configuration Audit (FCA) activity. Configurafion verification should be an imbedded function of the build, testing, and acceptance process.

The process begins by preparation of a Configuration Audit Plan, which will include a detailed agenda, schedule, methodology, and sign-off process for the audit(s). The plan will establish and monitor elements/items to be audited and the documentation needed to create an audit library. During the audit, marking, configuration, and status of baseline products and configuration records are verified and correlated. Inspection and verification of product and design information accuracy, consistency and conformance with requirements is established using the CSA database and the actual product. Results are documented, action items established and tracked to closure, and final audit results are disseminated. QA provides certification to the accuracy and correct configuration of products delivered to NARA as part of the ERA program.

3100K Problem Trouble Reporting Process

The Problem Trouble Reporting (PTR) process is the Lockheed Martin Team defect management process that ensures product problems are documented, communicated, properly prioritized, and fixed to create a stable, usable system meeting NARA requirements.

Defects are recorded on observation logs during test execution and then recorded in the CM database, which automatically assigns a defect number. This database is implemented using the CM tool PVCS/Dimensions. Defects may be opened against software, hardware, COTS, documentation or other project artifacts. Information collected includes, but is not limited to:

- Summary and concise description of the problem;
- Information related to recreating the problem;

- Configuration Identification, program, module information;
- Status and key dates (opened, fixed, closed, etc.,);
- The development phase and increment release where it was found;
- Relevant personnel involved;
- Severity, priority, and impact assessment (originator & PRB); and
- Other data as needed.

Reports and queries are run by project personnel via the PVCS defect database. Defect data is presented regularly at internal meetings and at program reviews, test readiness reviews, and other test briefings. Reports are made available for NARA to view via the program Team Portal. Two main groups manage the tracking and prioritization of defects, the PRB, and the TAC. The PRB reviews new defects on a regular basis throughout the project lifecycle to determine whether the defect should be approved or rejected (duplicate, user error, etc.,), assign the severity and priority level of each defect, and establish a needed fix date.

In addition to the PRB management, during dry runs for formal acceptance tests and during execution of formal acceptance test phases, the TAC determines which defect fixes are needed to meet the entry and exit criteria of the test program. Formal software releases are built with a content list including which defect numbers are fixed in the release, the name and version of each code module in the release, and the defect number for which it was checked in. Formal tests are conducted using only CM organization-generated formal builds following CM processes to baseline and control the content of the software releases. The TAC determines whether, when, and which defect fixes are needed to exit a test phase. Based on the decision of the TAC, a new software baseline may be generated by the CM organization with only the defect fixes required to exit test. Regression tests and specific functional tests may be re-run as assessed by the TAC based on the impact of newly delivered fixes on previously run tests.

The intent during formal test phases is to limit the amount of change to tested software baselines to only those fixes required to enter and exit the test phase. This approach will minimize the possibility of injecting new problems and minimizes the number of tests needing to be re-run because system baseline changes may have invalidated previous test results.

Defects are closed when the originator of the defect and Quality Assurance verifies the problem is fixed using the CM-managed software baseline. The PVCS defect database is updated with current status at each step of the process.

3100L Change Control Process

The Change Control Process assures thorough review and analysis of each programmatic change. An engineering-level and program-level review board is established to assess proposed changes. The process also encompasses the coordination and submission of NARA approval-level changes to NARA's ERA CCB and/or ERB as defined by NARA's CM Plan.

The Change Control Process flow for a typical change is shown in Figure 16–33, Change Control Process. The process flow shown is for a typical baseline change that doesn't affect contract scope.

- Specifics of the change with enough precision and detail (such as quantities, requirements, function descriptions) for others to correctly determine their impacts and costs;
- Type and priority of change;
- Reason the change is needed and the need date;
- Preliminary estimate of the baselines and functions affected;
- Preliminary estimated program cost and schedule impact ; and
- Impact if not approved.

The originator generates a change request form with the information above and submits the CR to CM for entry into the PVCS CM Change Request system. The CM determines the type of impact from a cost, schedule, and technical perspective and sets the approvals needed from the ERB and the CCB for the particular change, referencing designated approval levels specified in the CM Plan.

A CR that requires emergency approval is "walked around" by CM and/or the originator for presentation and approval from each member of each board that must approve the change. The rest of the Change Control Process must still be followed after emergency approval.

When first presented to the ERB, the originator presents the change, explains its concepts and description. The purpose is for the board to understand and determine the high-level impacts of the requested change and approve the assessment of the CR by the designated assessors.

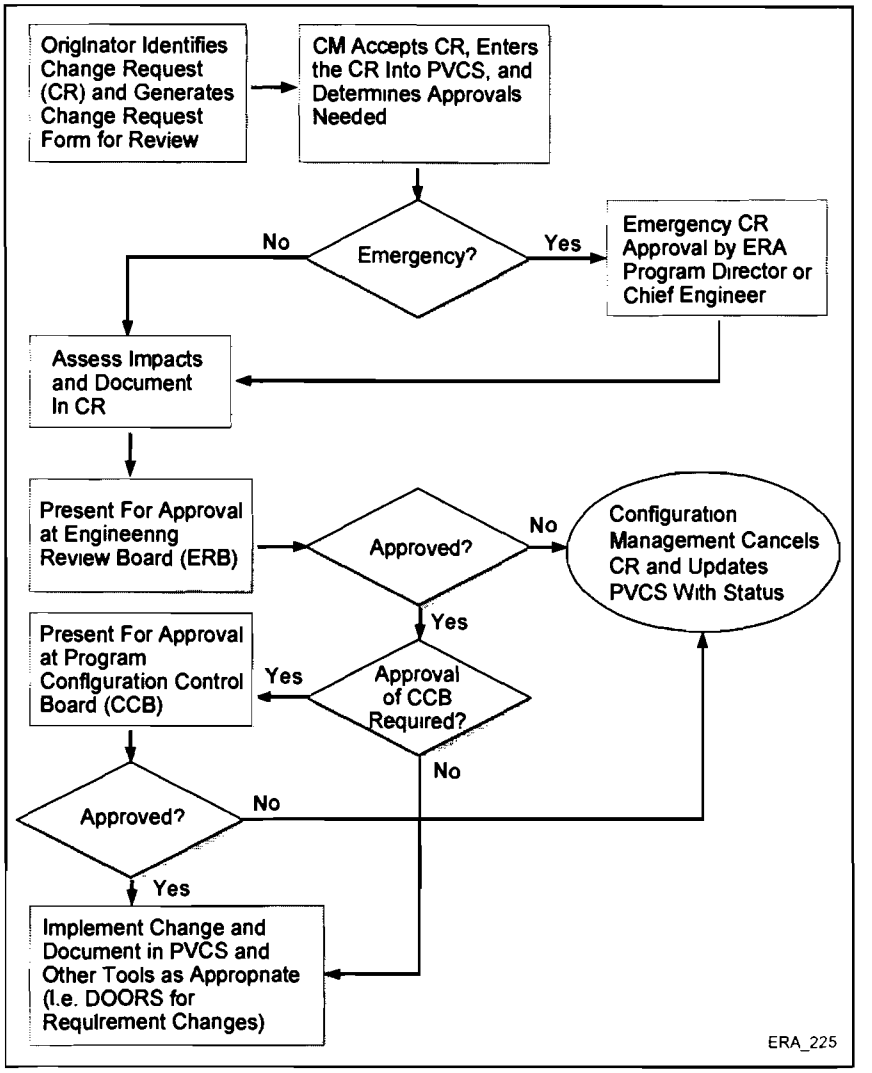


Figure 16–33. Change Control Process

A change originator identifies a change (or is directed to process a change) and determines the information needed to assess it to include, but not limited to:

Impact assessors then coordinate cost, schedule, and technical assessments with the appropriate technical reviewers and then document the detailed cost, schedule, and technical impacts (to include dollars, days, resources, etc.,), or lack thereof, in the PVCS Change Request database record associated with that CR. Once all required impact assessments are completed, CM presents the CR to the ERB for approval. If disapproved, the CR is cancelled and CM documents the activity and final status in the CR database. If approval is granted and escalation to the program CCB is not required, the change is implemented and the CR database and other configuration and requirement databases are updated and stakeholders notified.

If the CR requires further approval at the CCB, CM and the originator presents the CR and associated documentation to the CCB for approval. If approved, and NARA ERA CCB approval is not required, the change is implemented and the CR database and other configuration and requirement databases are updated and stakeholders notified.

If further NARA ERB CCB approval is required, CM coordinates the review of the CR with NARA CM for presentation at their CCB. At each level of the ERB or CCB, the designated chairperson can unilaterally resolve assessment conflicts to prevent delays in processing critical CRs.

3100M Software License Management

Product Control, a function within CM, is responsible for the management and control of all COTS software for ERA. Product Control is responsible for the receipt, version tracking, license management, maintenance/warranty tracking, and distribution and is the official repository for all products.

A database of all software licenses and expiration dates for each software program covered by this contract is established and maintained. Through the Software License Management process, Product Control identifies and maintains an accounting of software licenses on operational assets and within software support facilities. The accounting shows the ownership of the license, the type of license, usage limitations, and the allocation of the license to individual asset. The process ensures that required license fees are paid. The key process inputs include software license status, vendor support announcements and upgrade notifications, and software and performance problem reports or trends from the labs or operational facilities.

All COTS software that is used on the program must be checked out of the Product Control library. The Product Control librarian will verify that there are adequate licenses prior to issuing the software to the user. The user shall provide all installation information so that the license record can be updated with any current installations.

The CM Team will periodically verify the use of software licenses by conducting audits of program labs and facilities.

3100N Physical Configuration Audit Process

CM coordinates the conduct of the Physical Configuration Audit (PCA) and the Functional Configuration Audit (FCA) for ERA. The CM Team acts as the host for the audit and provides NARA with all the relevant data required to conduct the audit.

CM prepares an audit plan that is submitted to our customer for their approval. The audit plan documents all the details of the audit.

- Primary Elements of the Audit Plan:
  - — Date/time and location of audit;
  - — Required and suggested participants;
  - — Audit action item plan;
  - — Hardware and software contiguration items to be audited;
  - — All relevant documentation, including hardware drawings and software listing, needed to support the audit;
  - — Listing of all relevant reports and statuses; and
  - — Recommend criteria for successful audit.

At the audit, the ERA project will present the hardware and software for audit. To support this, the hardware drawings and software listings will also be provided. The audit will verify that the items being audited match the supporting documentation and that the supporting documentation represents the approved baseline. In addition to the items and their documents, a current status of all change records, problem reports, and any other relevant reports will also be provided.

Unless the data within a document is required to conduct the audit, a record indicating that the document has already been submitted and approved by NARA will be provided.

Any actions assigned during the audit will be recorded and tracked as agreed-to in the action item plan. All actions will be assigned an owner who is responsible for the action item. Expected or required closure dates for the actions will also be assigned.

At the conclusion of the audit, the CM Team drafts an audit report that documents all events and status of the audit. The audit report documents all the findings of the audit. The report also includes the status of the action items. With NARA's approval, the audit report may be updated to reflect current status of such things as the action items.

The completion of the PCA will establish the Product Baseline for those items that were part of the audit.

3200 Requirements Analysis

The Requirements Analysis Processes allocate identified system requirements and functions to architectural system and sub-system elements. The processes establish and maintain an ERA requirements baseline and traceability matrix, and ensure the approval and documentation of changes and reallocations of the requirements baseline. The processes ensure active participation from all engineering disciplines to develop clear, well understood, veritiable requirement statements. The processes also include developing and documenting verification methods for each requirement statement.

3200A System Functional Requirements

For the ERA program, requirements definition begins with understanding NARA's specified functions and performance levels within the context of the system architecture. The Lockheed Martin Team collects and clarifies requirements from the ERA and NARA requirements documents, Technical Interchange Meetings with Stakeholders and SMEs, and the NARA requirement questionnaire process. Requirements are then decomposed and allocated to a primary method of implementation via a defined combination of hardware, software, and/or operations.

The Requirements Management structure that executes the System Functional Requirements management process starts with the System IPT which establishes a system-level Requirements Review Board (RRB) with representation from NARA ERA PMO (and associated representative ERA stakeholders or Subject Matter Experts as available through ERA PMO). Once established, the Segment IPTs create similar boards, designated as Design Control Boards (DCBs), within

their respective segments and include representation from the Systems Engineering Group and the other segments.

As the requirements analysis process proceeds, we further refine the initial ERA requirements statements and identify and derive additional candidate system requirements. They are documented by the ERA System Requirements Specification (SyRS) which will be submitted for NARA review and approval at the SRR.

The RRB and DCBs lead and control the decomposition and refinement of their assigned specifications, the allocation of requirements to lower level specifications, and the evaluation of ERA impacts/benefits resulting from requirement changes. In conjuncfion with the System IPT, the segment IPTs allocate the high-level requirements through the service-level segments (Ingest, Storage, Dissemination, etc.,) to the subsystem software and hardware. Within this allocation process, allocated requirements are either restated as-is, rewritten, or decomposed into lower level requirements as necessary.

Requirements are verified for completeness, correctness, accuracy, traceability, testability, feasibility, and consistency by the engineering and test groups and collaboration with NARA SMEs and PMO. Technical risks identified during requirements analysis are assessed and recorded along with risk mitigation plans. Once system and segment requirements are baselined, changes require analysis and approval using the ***3100L Change Control Process***.

Once requirements are fully allocated at this level, the System IPT directs the decomposition of the requirements into functions to be developed by the IPTs. Thereafter, development IPTs generate the lower level allocations for each subsequent element in the traceability hierarchy.

Requirements are maintained and linked in the requirements management tool and repository (e.g., DOORS®) to establish traceability between the lower requirements and the parent requirements. This includes both downward and upward traceability from NARA's requirements and objectives down to detailed solution requirements, and through to the corresponding design components and testability. We establish and manage baseline control of the requirements with respect to their allocation to particular releases and increments, with each baseline officially reviewed through the sequence of formal requirements reviews. Standard and Ad Hoc requirements reports are generated and made available directly or through the Team Portal. The Analysis and Design Phase Requirements Management process is illustrated in Figure 16–34, Requirements Management Process.

Generated from the requirements traceability database, the Verification Cross Reference Matrix (VCRM) is an extension of the requirements traceability tables generated and maintained by the System Team. The VCRM contains requirement traceability references to the source specification and the associated method of verification. Other information (e.g., tests, status, defects, etc.,) are added as the ERA program evolves so that the VCRM is then used as a test management tool.

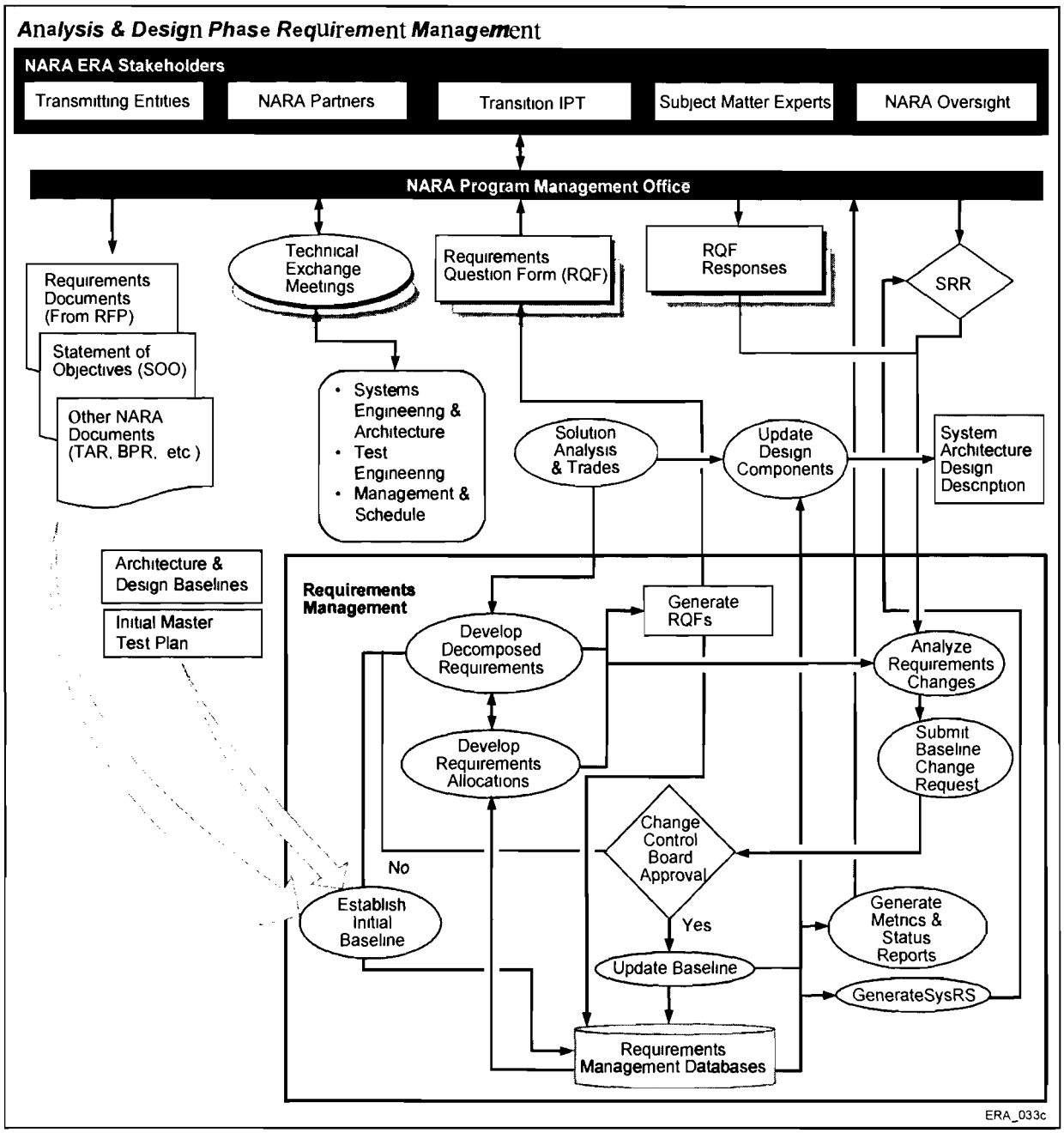


Figure 16–34. Requirements Management Process

3200B System Modeling Process

The Lockheed Martin Team creates system models to allow the performance of the ERA system to be predicted and to influence future system evolution. These models predict parameters such as data ingest rates, total storage size (and its distribution by site and file format), search and retrieval response times, and network loading. Since these functions do not all exist in isolation, the models are combined to provide a coherent picture of the performance of the entire system at the architectural level.

The system modelers start at the beginning of the System Analysis and Design phase with the identification of the parameters needed to be able to predict system behavior and the creation of an initial model to influence the design taking shape during that phase. As the models are predictive, the validity of the predictions can be tested over time and iteratively updated throughout the ERA lifecycle. This requires the system operators to collect appropriate metrics measuring the performance of the ERA system. This collection and prediction process can be expected to be fairly mature by the time initial operating capability is reached.

The models are used to allow a number of performance criteria (e.g., availability and responsiveness) of all parts of the system to be quantitatively analyzed. For example:

- In the ingest function, the models predict the time needed to clear an ingest backlog and analyze the most effective strategy for dealing with it.
- In the storage function, the models predict the rate of increase of storage and the manner in which the records are distributed by size, format, and appropriate geographical location.
- In the dissemination function, the models predict the capacity required to cope with demand and to investigate strategies for dealing with dissemination peaks, such as those caused by the release of popular records and balance the cost and performance associated with each such strategy.

The Lockheed Martin Team recognizes that different user classes place different demands on parts of the system. The system usage is illustrated in Figure 16–35, ERA System Modeling Usage. For example, Records Processors push data through the system in vast quantities, while consumers search indexes and "pull" relatively small number of records from the system. The models reflect the different nature of these parts of the system and assist in choosing the deployment options and tuning for the appropriate servers.

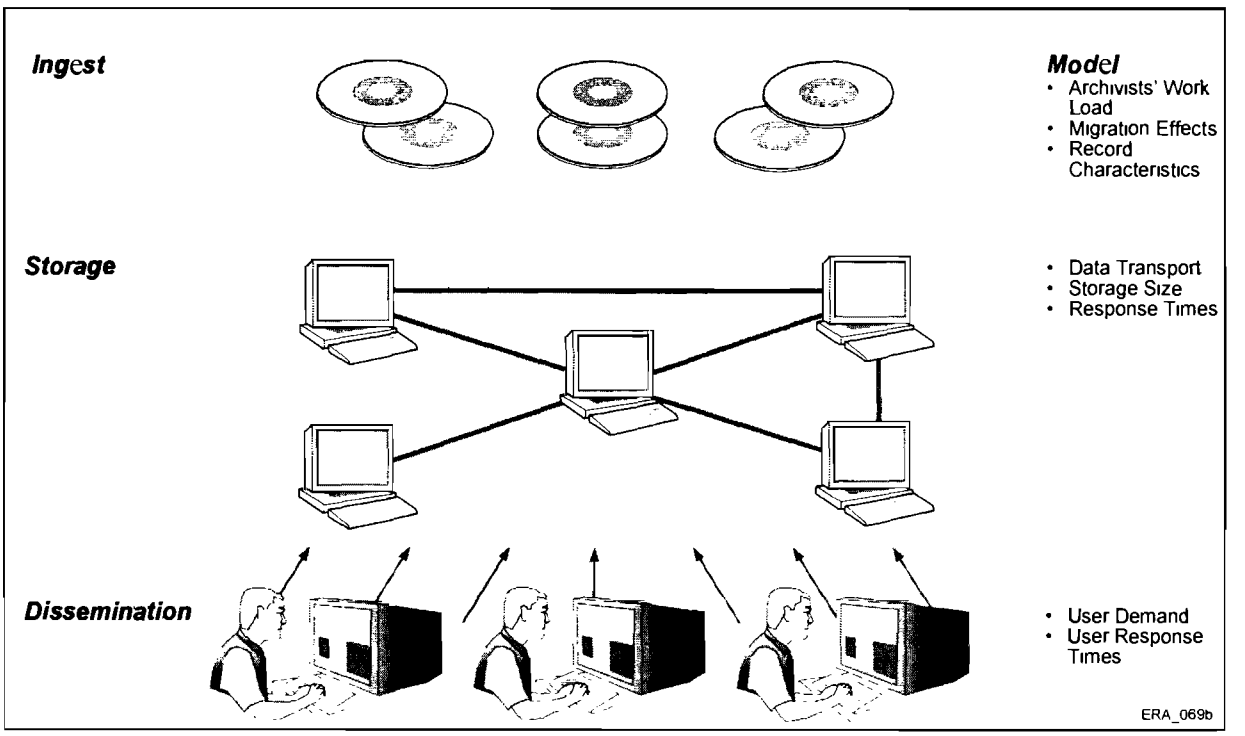


Figure 16–35. ERA System Modeling Usage

Some performance measures require a view of the entire system. For example, the storage servers need to be able to cope with the demands placed on them by ingestion and dissemination of files, as well as storage-related "housekeeping" functions. Thus, the models also ensure that the entire system view is monitored and they can predict the effect of system-level changes. For instance, the models can investigate the impact of a change in preservation strategy for a file format (e.g., a decision to migrate all files of certain type to a better POF). It is anficipated that such a decision will require ingest server processing fime (which could be scheduled outside peak demand) and place a demand on the storage system (since the files to be migrated need to retrieved and there would be a potential extra storage capacity).

The models can quantitatively analyze system evolution decisions for instance, predicting what the impact of adding extra ingest or dissemination servers, a change in storage media technology, or changing a COTS product (such as a virus checker) would be on various measured quantities (e.g., the rate of ingest, etc.). They can also help to predict the impact of an adverse event (e.g., server or network failures) and the ability to recover from such an event.

3300 System Design

The ERA System Design processes execute the synthesis, development, documentation, and review of the overall system design in compliance with the developed ERA architecture and engineering standards across all engineering disciplines. The processes ensure that design activities are executed in a consistent and integrated manner across the product IPTs and that designs are fully analyzed and approved at various stages in the lifecycle.

3300A System Architecture Design Process

The System Architecture Design Process is an iterative process, where concepts and alternative ERA architectures are developed, engineering trade studies are performed, and results are documented. The following tasks are performed:

- Analyze System Requirements. During system requirements analysis, the system functions, modes of operation, and support functions are defined. The lifecycle costs (development, test, production, integration, and support) of the system are evaluated to optimize long term value for ERA.
- Develop Functional Model. An ERA functional model is developed with the goal of defining the top-level functional view of the system while allowing for multiple hardware and software solutions. This allows for selection of the best value products for ERA during the component selection phase. The system-level functions are decomposed into major functions. The various system functions are allocated to or decomposed into hardware and software functions. Reusable components may be identified at this time to satisfy functions, reducing cost implementation risk.

The resulting model identifies the system boundary and depicts external interfaces on the system boundary lines. Internal to the system, system requirements are grouped into subsystems. The flow of data is shown among subsystems and external interfaces as well as the major data stores.

- Develop Physical Model. In parallel to generating the functional model, a physical model of the system is generated. The physical view of the system is depicted in architectural diagrams, and interface definitions. The physical view of the system responds to physical system requirements, is hardware oriented, and addresses the physical fit of system into the ERA environment.
- Develop System Architecture. The system architecture describes how the system is partitioned into subsystems, how the functional model and requirements are allocated to physical architecture subsystems, and how these subsystems communicate with one another. Viable architecture candidates are identified. These candidates represent different ways of partitioning the system and utilizing current technology. Each candidate system architecture is evaluated against system requirements and operational scenarios for compliance. In addition to satisfying all stated requirements, the architecture solution addresses issues such as system availability, performance, safety, maintainability, transition, scalability, extensibility, and design for affordability. The system is optimized for the ERA system by taking into consideration the system requirements, technical performance, reliability, maintainability, availability, lifecycle cost, and associated risks in design decisions.
- Develop Operational Model. The operational model for the ERA system describes how end users (operators) interact with the system to perform their roles and responsibilities. This model is built to be consistent with the System Concept of Operations (ConOps) document and shows the steps of workflow threads at a logical level. During the design phase of the program, these models are decomposed and mapped to specific system components.

3300B Data Architecture and Design Process

The Lockheed Martin Team Database Architecture Design Process ensures that all data interfaces and information assets are managed in a consistent, unified manner. Figure 16–36, Data Architecture Attributes, shows the Lockheed Martin Team's layered approach to developing the ERA data architecture. The ERA data architecture and design process begins at the Architecture Layer in which foundational elements such as data definition and access protocols, the standards used to define and manage the data, and the processes for data management are defined. This initial phase ensures compliance and consistency with NARA standards and enterprise architecture early in the development cycle.

In the Conceptual Layer, the terms used to describe and represent ERA information and tasks are defined, along with data management requirements, data schema, and associated risk mitigation approaches. A conceptual data model is defined, which includes standardized descriptions of NARA concepts, or items, the relationships among those items, and the properties of each item. The ERA Conceptual Data Model definition begins with the definition of the ERA ontology, the formal set of terms used to describe and represent ERA information and tasks. The ERA ontology is based on the NARA enterprise conceptual model and glossary, and any associated information on the definition and relationship among NARA concepts, such as NARA taxonomies, thesauruses, or other formal definitions of terms. During the software architecture design phase, ERA mission-specific concepts are added to the ERA ontology. Finally, NARA business processes are reviewed to ensure that the terminology in the ERA ontology is consistent with that used in the NARA enterprise glossary. The ERA Conceptual Data Model is initially created using industry standard technology, as a set of XML-coded Resource Descripfions and Associations.

During the Application Layer definition, the ERA Data design is captured in a Logical Model, along with data structures, views, and data content requirements. The ERA Logical Data Model describes data in an implementation-independent fashion and is used to verify that data satisfies all business and technical requirements. This model is composed of data elements and structures, and may include data constraints derived from ERA business rules and requirements. The ERA Logical Data Model is based on data requirements placed on the Conceptual Data Model by software design and engineering staff.

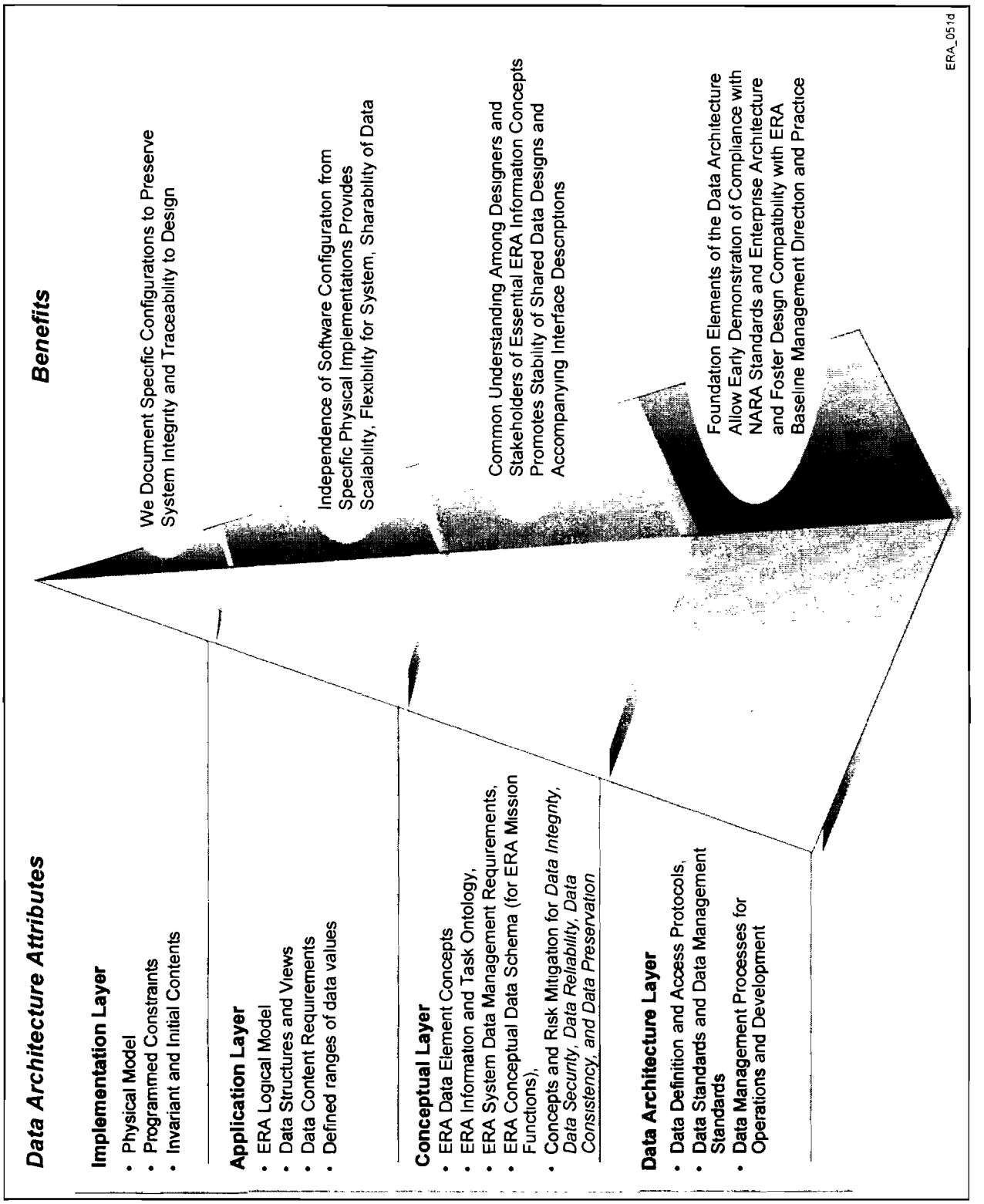


Figure 16–36. Data Architecture Attributes

In the final, or Implementation Layer definition, the Physical Model of the data is determined and documented. The ERA Physical Data Model is a representation of actual data objects in the target operational environment. This model records the specific system objects instantiated

during the operation of the implemented system. All objects in the Physical Data Model are associated with entries in the Conceptual and Logical Data Models. The Physical Data Model includes any information needed to successfully represent and actual instance of a data object in the target operational environment such as allocation directives, device, and port or queue assignments. The initial version of the Physical Data Model is created during the implementation phase of each increment.

All artifacts generated while developing the ERA Data Architecture and Models are baselined, placed under configuration management control and promoted to the Team Portal. As system and software engineering progress through increasing levels of detail, changes may be identified for these data models. The changes must be captured in Change Requests (CRs) and submitted to the CCB for approval before implementation.

3300C System Security Engineering Processes

The Lockheed Martin Team uses a set of processes to perform security engineering tasks, in order to ensure that all security requirements are met and that operational security is maintained. Figure 16–37, Relationship to Security Processes, shows the relationships of the processes and how they contribute to the overall security engineering discipline.

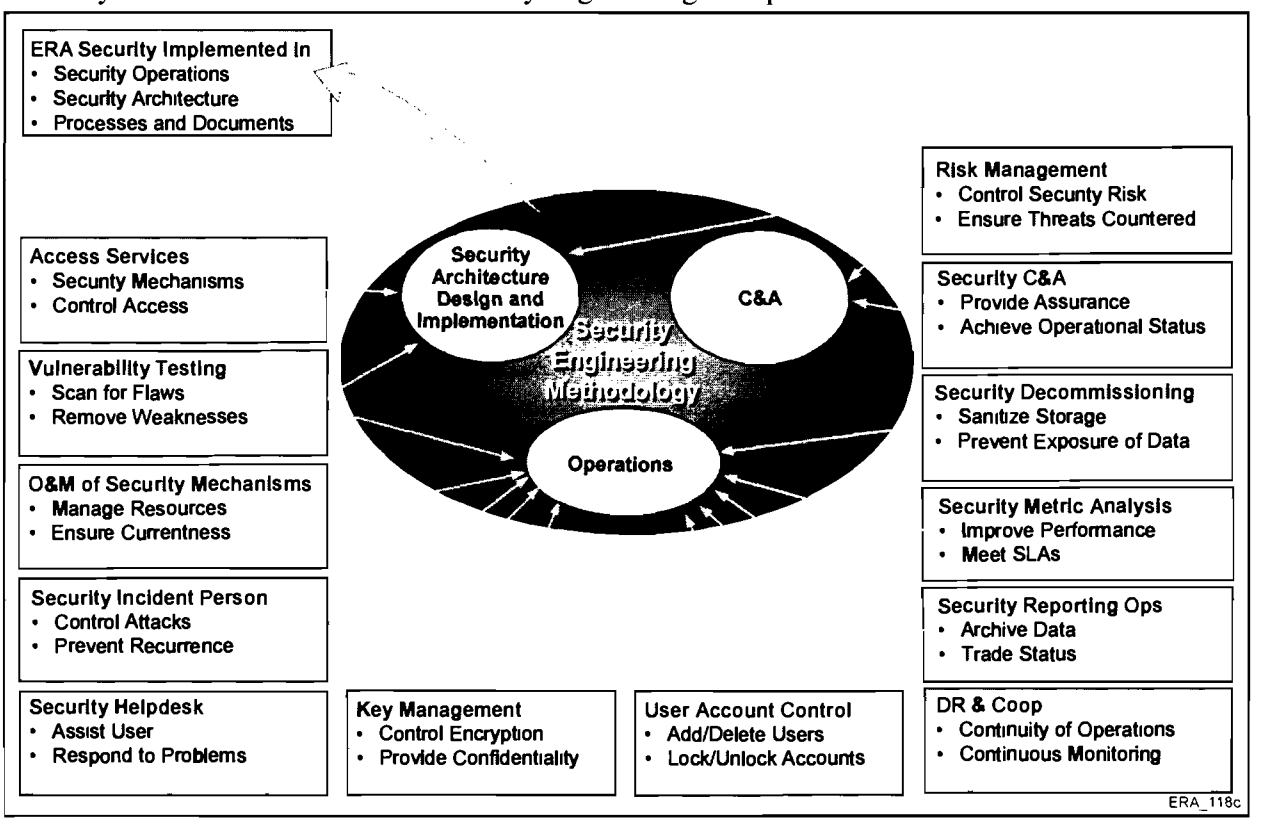


Figure 16–37. Relationship of Security Processes

The Lockheed Martin Team maintains the Security Risk Analysis of the ERA system and components, updating the risk analysis as new components are added or upgraded. As part of this process, the team also monitors security news sources, such as SANS and the Carnegie-Mellon CERT, and vendor security vulnerability/fix sources. The team implements tixes after testing in

a manner commensurate with the seriousness of the vulnerability. The team monitors new security products for applicability to the ERA environment, and incorporates them as approved by NARA.

The Lockheed Martin Team will develop and follow the Security Certification and Accreditation (C&A) process shown in Figure 16–38, Certification and Accreditation Process, based upon the DITSCAP process. The team will maintain the technical and procedural documentation required as part of the certification process for each ERA installation and will provide C&A support throughout the ERA lifecycle. Major changes in the ERA system design and implementation of the ERA system will require recertification of the deployed systems. The team will maintain reports on the status of each site in accordance with C&A.

The Lockheed Martin Team will develop and follow a secure recovery process for the ERA system. The process will apply to the safe recovery of security functionality after an interruption in operations, and will be updated as needed throughout the ERA lifecycle. This includes support/recovery from outages caused by security incidents, and continuity of the security operations subset of the Systems Operations Center (SOC). In addition, the team will monitor the Internet Alert Levels, as posted by the DHS IAIP daily report, and take appropriate action to mitigate impending interruptions. These actions potentially include increased monitoring, more restrictive rule sets for firewalls, disallowing dial-up connections, or disconnection from the Internet and other external networks.

The Lockheed Martin Team analyzes Intrusion Detection feeds, in conjunction with other security information (such as firewall, VPN, and router logs), to correlate like events across ERA. To support the team's intrusion analysis, data is retained at a central security repository. The stored data includes:

- IDS alarm and configuration data;
- Firewall security alarm and configuration data;
- VPN device configuration data; and
- Router contiguration data.

The team analyzes this data and has overall responsibility for managing responses to all ERA security incidents. The analysis of data involves the use of algorithms and tools that focus on the detection of patterns associated with security incidents. The ERA generates security incident reports based upon this analysis. This batch analysis of information from the security repository will supplement the real-time alerts. All security data pertinent to the operation, maintenance, and history of the ERA is stored in the security repository. The security repository is a logical database, managed and used by the team. The repository is fed security data from throughout the ERA system, about all facets of security status, operations, and management. For example, the repository provides the team the information they need to seek and distinguish security patch news. Guided by the configuration information in the security repository, the team will monitor sources of security news such as vendors, development, and maintenance reports, trouble tickets, and industry-wide security alert sources such as SANS and CERT.

The Lockheed Martin Team provides help desk support for security related problems. The help desk resolves incidents ranging from password issues to virus outbreaks, or any other security incident reported by users. Security trouble tickets are prioritized and routed to the proper personnel for resolution. The help desk personnel will coordinate with the security incident resolution personnel when security incidents are reported by system users.

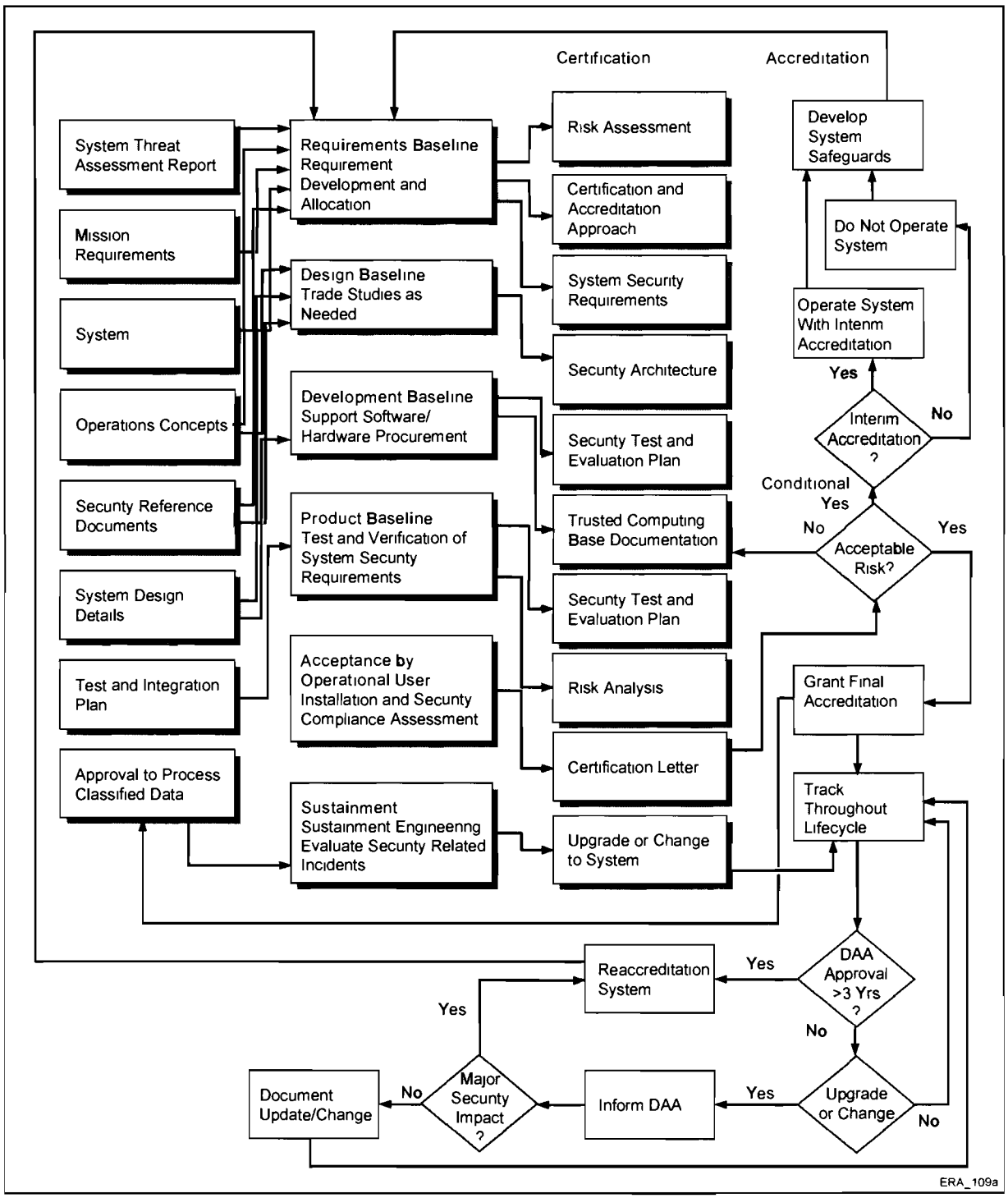


Figure 16–38. Certification and Accreditation Process

The Lockheed Martin Team tracks the release of new security patches and virus signature files by suppliers. The team is responsible for the rapid dissemination of fixes, updates, and signature files to the security mechanisms. The team will coordinate with NARA personnel to prioritize security fixes and new releases. In some cases, the emergency nature of the security flaw addressed by the fix may necessitate high-priority testing and deployment—balancing the security risk against potential operational impacts.

The team maintains the approved rule sets for firewalls and gateways and processes change requests from NARA or necessitated by evolution of the ERA system. Rule changes are tested and placed under CM control before being deployed.

The Lockheed Martin Team periodically performs vulnerability scans of the ERA systems. Workstations, servers, network devices, and security devices are regularly scanned. For any vulnerabilities found, the team will produce a plan to close the vulnerability.

The Lockheed Martin Team is responsible for adding, modify, and deleting user accounts for ERA. The process allows users who are terminated under adverse circumstances to be removed immediately. User lock-out and account delefion will be accomplished within minutes. Creation of and changes to user accounts will be accomplished within hours of receipt of an authorized and verified request.

The Lockheed Martin Team will collect, analyze, and report security metrics to NARA which will allow improvement in the ERA security posture and enable the team to meet Service Level Agreements (SLAs). (Security SLAs and specific security metrics will be defined during the Analysis and Design phase.) Metrics may include response time to security incidents, virus containment, security awareness training, user account management, response time to implement fixes, and robustness of security mechanisms.

The Lockheed Martin Team will perform the decommissioning and repair of ERA equipment, according to agreements reached with the originating agency. Before equipment—permanent memory in particular—can be reused, discarded, or sold the residual contents must be sanitized to ensure that no sensitive information can be scavenged. This includes any parts of a unit, such as a disk drive or flash memory. At end of life, all memory units will be destroyed. Repaired units will be sanitized before reuse. As appropriate and economically feasible, units will be degaussed, overwritten, or reformatted at the bit level. If sanitization is not feasible, the unit will be physically destroyed.

The Lockheed Martin Team will be responsible for initializing, changing, and destroying encryption keys. The details of this process will be defined during the Analysis and Design phase, as the use of encryption devices is defined.

The Lockheed Martin Team will ensure that appropriate information security measures are included during the design, development, and test of the ERA systems. The team will allocate security requirements to ERA system components, and architect and design the security components, including the security infrastructure. The team will implement the security solution through integration of security products and/or development of security mechanisms. The team

will use security checklists to ensure that all software components provide the requisite security functionality and assurance and that known implementation pitfalls are avoided (e.g., buffer overflows). Security checklists will be utilized during peer reviews.

3300D Human Factors Engineering Process

The Human Factors Engineering process, shown in Figure 16–39, Human Factors Engineering Process, is used throughout the ERA Program Lifecycle. NARA subject matter experts work closely with human factors engineers throughout the process. Usability evaluations are a central component of the process during the design and test phases of the program. They are conducted using the Lockheed Martin usability laboratory. In this setting, representative end users perform critical operational tasks while test conductors monitor and record their performance. Monitoring is done unobtrusively using two-way mirrors, video cameras, and by mirroring the user's computer screen onto the test conductor's computer. Usability metrics are collected, such as numbers and types of errors, task success rates, task duration and complexity, and qualitative measures of end-user acceptance. Multi-media demonstrations of task performance can be produced from the recordings.

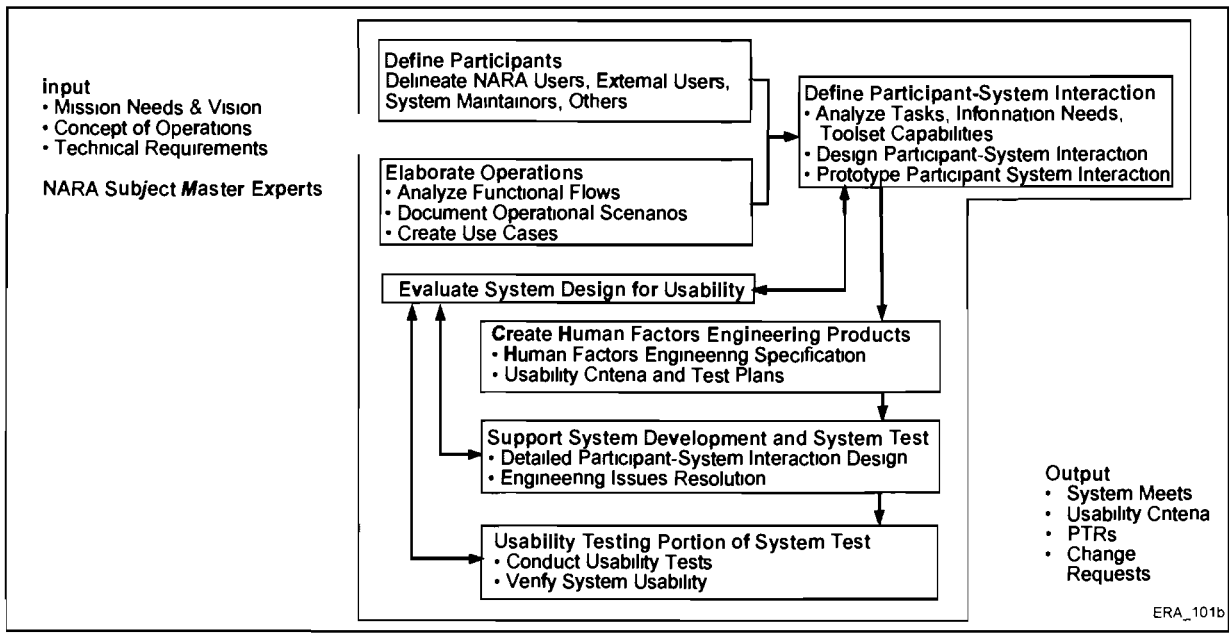


Figure 16–39. Human Factors Engineering Process

The human factors team refines the project understanding of the eight system user classes. The team identifies information useful in establishing an operationally suitable system design, such as the numbers and types of users, accommodations required for handicapped individuals, and their task and skill requirements. The team performs analyses to provide greater depth of understanding of the participant operations. Analyses may include functional work flows, detailed operational scenarios for critical system threads, and use cases that express operations in a fashion facilitating system design. These steps together facilitate the iterative definition of progressively more detailed system requirements.

Building upon the understanding of participants and operations, the team conducts analyses of projected user tasks to support the definition of participant-system interaction. These analyses may include step-by-step definitions of task performance, task information requirements, and the projected capabilities of the ERA toolset. These analyses facilitate the design of the user interface for these interactions. User interfaces for performing critical scenarios and use cases are prototyped and evaluated for their projected usability. The team works closely with NARA subject matter experts throughout the design, prototyping, and evaluation process. The product of these efforts is the Human Factors Engineering Specification. The team provides continuing engineering support throughout system development. The team defines and conducts the usability-testing portions of the system test program, and verifies that the Human Factors Engineering Specification is met.

3300E Safety Engineering Process

The System Safety process defines the steps needed to implement a comprehensive safety program. During the initial step, the ERA Program Director works with the program Safety Manager to develop a Safety Needs Document (SND). This document defines which steps of the Safety process are required to meet the safety needs of the ERA program, based on specific customer safety requirements, and on Lockheed Martin requirements for ensuring that safety risks are mitigated to an acceptable level for all delivered systems.

A safety program is established after creation of the SND, with responsibility for system safety activities allocated to a Safety Team. Activities performed by the Safety Team include:

- Safety program management;
- Identification of hazards, producing system safety hazard analysis reports;
- Analysis of hazards and safety risk analysis, documenting causal factors, prioritizing hazard severity and likelihood, and documenting risk reduction targets to achieve an acceptable level of risk;
- Development and allocation of safety requirements, documenting the functional safety requirements, and the required safety integrity for each requirement, and allocating the safety requirements to system components;
- Management of safety-related suppliers, analyzing and documenting the program's needs to acquire safety related products and services, selecting suppliers for these products and services, establishing supplier agreements that include appropriate safety requirements, and ensuring that safety assurance is delivered with the supplied product or service;
- Safety integrity assurance, assessing the safety program and associated work products throughout the system lifecycle to ensure that residual safety risk has been reduced to an acceptable level; and
- Support safety acceptance and certification, producing or supporting the development of a system safety assessment report.

3300F Continuity of Operations Process

The ERA Program Continuity of Operations (ConOps) process is based on NIST Special Publication 800-34, "Contingency Planning Guide for IT Systems" and is illustrated in Figure

16–40, ERA Continuity of Operations Process. Continuity of Operations recovery requirements includes such things as allowable disruption times, recovery priorities, and critical resources.

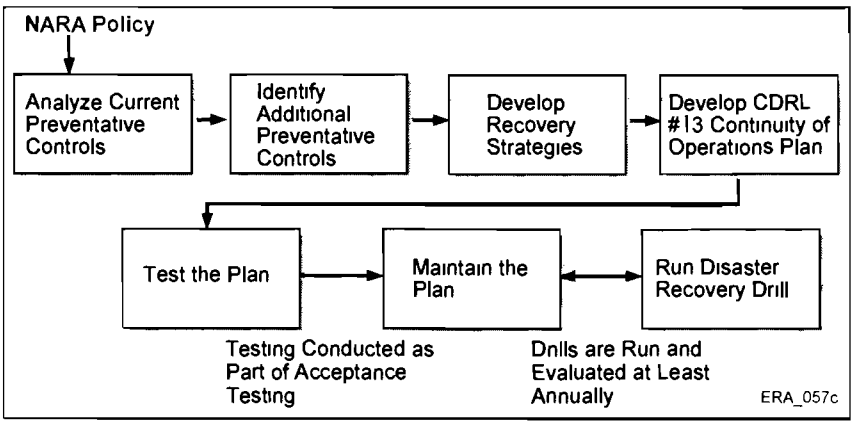


Figure 16–40. ERA Continuity of Operations Process

Primary participants in the requirements definition and plan formulation include the ERA Chief Engineer, NARA IT Representatives, and the Deployment and Operations IPT.

An architecture review and a business policy review are performed to determine the preventative controls that are already supported, such as safe store approaches, special facility functions, and existing continuity of operations procedures. A Gap Analysis is performed; additional controls are identified as needed. These additional controls are documented in CDRL #13 Continuity of Operations Plan. The plan will also contain, at a minimum, the following:

- A set of recovery strategies. Recovery strategies may include the use of additional storage or operational sites.
- A description of pre-defined business agreements. The agreements are included so that all effected parties (NARA, ERA users, the Lockheed Martin Team) understand exactly what services will be restored, and the restoration priority. This also includes the agreements that have been established to provide alternate business capabilities; for example, one site may take over the business processing for another while service is being restored.
- Roles and Responsibilities. This is a list of all the participants and the required participation of each.
- Contact Lists. A contact list for all members of the recovery team as well as contact information for law enforcement and emergency service agencies is included.
- Site Evacuation Procedures and Emergency Security Procedures. Procedures for the physical security and safety of personnel and the ERA system are included.
- Alternative Communication Plans. Alternate communication paths, to be used when the primary path is unavailable, are provided.
- Documentation and Specification of Automated Failover Tools. The mechanisms built into the ERA system to provide 'automatic' recovery are documented.
- Procedures to Establish a 'Normal' Operating Configuration. The process and procedures to bring the ERA system into a useable, productive state are included.

With NARA's agreement, the Continuity of Operations Plan will be tested on a periodic basis. Drills will be held at least annually at each site. Primary participants in the drills include the ERA Operations staff, the ERA Chief Engineer, NARA IT Representatives, the Deployment and Operations IPT, and the IV&V organization. The plan will be updated throughout the ERA lifecycle; this is needed to address the addition of new business sites, capabilities, or policies. As each site deployment is prepared, the plan is reviewed and updated to address any unique site requirements.

3400 System Integration and Test

ERA System Integration and Test Processes ensure the collaboration and integration of the ERA increment designs, interfaces, and development activities and independent system and sub-system testing at appropriate lifecycle activity events and gate reviews. The processes establish standard test plans and test procedures, operational procedures, and integration test facilities at the program level to ensure adequacy and consistency of system and increment level tests prior to deployment of developed solutions.

3400A Integration and Test Process

The Lockheed Martin Team's integration and test process includes requirements analysis, planning and scheduling, developing test procedures, system integration, test execution, reporting, and NARA participation. Test execution is performed in several stages, each stage helping to progress the system to a more complete, stable state. These test execution stages include: known state testing, dry runs and run-for-record. Table 16–12, Levels of Integration and Test, lists the levels of integration and test, the owner of each level, the location of the testing, and the objectives of the testing.

Table 16–12. Levels of Integration and Test

Testing Level	Owner / Phase	Where Performed	Objective
Test Lab Installation and Checkout	LM Test Team	System Integration Lab	Verify the hardware, software, networks, COTS are properly installed.
System Integration	Software Development and LM Test Team	System Integration Lab	Incrementally stabilize the system including hardware, software, and COTS. Collect preliminary performance metrics. Verify functional threads through the system match expected results.
Known State Testing (KS)	LM Test Team	System Integration Lab	Determine the pass/fail status of each system requirement. Document and prioritize defects.
Initial and Final Dry Runs (IDR, FDR)	LM Test Team NARA witness if desired.	System Integration Lab	Dry Run formal test procedures. Document and prioritize defects. Collect metrics to determine test readiness at FAT TRR.

Testing Level	Owner / Phase	Where Performed	Objective
FAT	LM Test Team NARA witness if desired.	System Integration Lab	Verify the system meets requirements. Document and prioritize defects. Collect metrics to determine test readiness at PAT TRR.

The following list describes each of the integration and test process steps which are repeated for each release in each increment.

- **Requirements Analysis and Review.** Test personnel participate in requirements analysis to assure each requirement is clear, complete, and testable and to assure that the set of requirements describes the behavior and characteristics of the system which must be tested. This step includes assigning a test procedure name and a verification method to each requirement for the verification cross reference matrix (VCRM) generated with the System Requirements Specification (SyRS). Test personnel also review external interface requirements and interface control documents to assess test environment needs for simulating or connecting to these external systems. Test risks and issues are identified and documented in this step.
- **Planning and Scheduling.** Test and integration plans are developed early in the program to identify dependencies among system components and to schedule completion of component development to support the needs of the integration plan. The integrated schedule indicates when each acceptance test program is conducted. Prior to each TRR, a detailed scheduled is developed showing when each test procedure will be executed.
- Developing Test Procedures. Test procedures are written describing the required environment, prerequisites, execution steps, requirements being tested and expected results. Test scenarios and special configuration files are also developed during this step for each test procedure. Trained and qualified project personnel inspect test procedures for completeness, correctness, and conformity to project standards.
- System Integration. The system integration phase is performed iteratively as components become available based on the integration plan and development schedule.
- **Known** State Testing. During this step, test personnel execute the test procedures and record the pass/fail status of each requirement. System defects found are documented along with associated requirements, if applicable.
- Factory Acceptance Test (FAT) Dry Runs. During this step, test personnel exercise the test procedures until the test procedures and the system are stable and the Factory Acceptance Test (FAT) entrance criteria (requirements pass rate, test case pass rate, defect metrics) are met. Typically, there are two sets of dry runs, initial dry runs (IDRs) and final dry runs (FDRs). Dry runs assure that the testers, system, and support assets are available and prepared for FAT.
- Test Readiness Review (TRR). The Lockheed Martin Team conducts TRR with NARA to review the results of dry run testing against FAT entrance criteria to determine whether the program is ready to begin FAT. TRR assures that all stakeholders understand the state of the system and its preparedness and assures that spares and necessary support equipment are available.

- **FAT Run-for-Record Testing.** This step is the formal execution of base-lined Configuration Management (CM) controlled test procedures using base-lined Configuration Management (CM) controlled software builds installed in a base-lined CM controlled test environment. The tests are executed by the Lockheed Martin Team witnessed by quality assurance, and NARA representatives. For each test, a pre-test briefing is conducted describing the purpose and expectations of the test and a post-test briefing is conducted reporting the results. Deviations from, and redlines to the test procedures are annotated and recorded in the test reports. Defects discovered during testing are also documented in the test reports and then recorded in the defect database. Test artifacts are retained by CM. The FAT criteria are established by a base-lined Test Plan. These criteria typically include shall pass rates, test procedure pass rates, number of open defects by severity, and key stability and performance parameters. Final test reports summarizing overall results, exit criteria metrics, and issues are presented at the conclusion of formal test.

Reporting

Progress, results, and metrics of testing are reported in several ways, including formally delivered documentation, briefing materials, database queries, and reports. This data is shared with NARA at Program Management meetings, Test Readiness Reviews, pre-test and post-test briefings and other communication mechanisms as necessary. Test milestones are tracked in the NARA ERA program schedule and monitored on a regular basis by the test team and the program management office.

NARA Participation

NARA is included at many stages for the test program including review of documentation, participation at test reviews and briefings, and during formal test preparation and execution. Table 16–13, NARA's Participation in Test Activities, provides a summary of the key opportunities for NARA participation in test activities.

Table 16–13. NARA's Participation in Test Activities

Activity	NARA's Participation
Documentation/Formal and In-formal reviews For example: Master Test Plan, System Test Plan, Test Procedures, VCRM, Test Reports, Defects, Test Metrics, Audit Reports, and Schedules	NARA's participation regarding documentation includes the following: Review and comment on plans and procedures Agree on/approve defect severity definitions Agree on/approve formal test entry/exit criteria Visibility to test approach, environment, and tools Visibility to defects, metrics, and audit results Visibility to test schedule and resources
Meetings/Reviews For example: TRRs, ORR, Program Management Meetings, Pre-Test Briefings, and Post-Test Briefings	NARA's participation regarding meetings and reviews includes the following: Key participant at these meetings Go/no-go decisions at readiness reviews Defect prioritization during Acceptance Tests

3400B ERA Integration and Test Facility Processes

The Infrastructure and Lab Engineering (ILE) organization is responsible for the planning, design, implementation, and support of the integration and test facility. ILE maintains the lab, performing routine back-ups and develops a continuity of operations plan for the lab. Lab configuration and changes are controlled through the submission of Infrastructure Change Requests (ICRs) by lab users. These requests are processed and managed by ILE. The processes used to perform these activities are described in this section.

Lab Planning and Design

The ILE Lab Architect, concurrent engineering Lab lead and lab engineers work with the ERA System Architect, Software Architect, Test Architect, and others as needed to understand and develop a high level lab architecture diagram and physical floor plan for each test facility. A series of lab design inspections are held to review the high level lab diagram, site layout, bill of materials and implementation schedule. ILE personnel also design and document planned facility modifications, detailed point to point wiring lists, and technician instructions. An ITRR (Internal Test Readiness Review) takes place after all design work is complete, prior to the installation of hardware and software. The review is attended by representatives from lab engineering, lab management and the System Architect, Software Architect, Test Architect and others. Signatures are required at these reviews, indicating agreement by all on the documentation. This documentation makes up the SAPR (System Assurance Product Review) guide. The Factory Lab Engineer (FEE) is responsible for control of the SAPR and for scheduling all internal reviews.

The plans for the test facility are also approved by the Chief Engineer and the Program Management Office at the Engineering Review Board (ERB) and the Program Configuration Control Board (PCCB). Once the plans and schedule are approved, ILE personnel define facility fit-up requirements for lab implementation, develop and document a lab build plan, and write a Statement of Work to subcontract the facility fit-up work.

Lab Implementation

After the facility fit-up is completed and inspected, ILE performs the hardware installation activities including: physical installation of hardware, interconnection of cables, attachment of equipment to floor and walls, and population of any unassembled frames (including customer-furnished equipment.) To ensure safe operation with minimal disruption of the existing operational systems ILL coordinates with the Chief Engineer and Test Architect to schedule the installation activities. After the physical installation is complete, an initial power on self-test (POST) of each unit is performed to ensure proper connectivity and function of the hardware.

System installation continues with software load and system checkout by ILE with support from Software Engineering and/or the Integration & Test (I&T) organization. The execution of any network topology test and resolution of any connectivity problems discovered are addressed as action items or punch list items. Examples include adjustments or alignment procedures, execution of any extended diagnostics and resolution of hardware problems.

ILE employs installation and lab handoff checklists to ensure lab readiness before handoff to the lab owner. The lab is considered to be in a construction phase until the lab is handed off to the

lab owner. Malfunctions are not documented until after this handoff occurs, when the lab is put in a production state.

The following list summarizes the process steps and activities regarding with lab implementation.

- Interface with Engineering and Program Office to define lab environment;
- Track changes in lab BOM;
- Produce lab layout and wiring diagrams;
- Track orders for lab hardware and software;
- Write work orders for Facilities organization;
- Manage Facilities effort to ensure power, A/C, and physical requirements are met within cost and schedule constraints;
- Install hardware (racks, cables, equipment);
- Check out hardware;
- Install and configure network and COTS software products;
- Check out network and COTS software products; and
- Test integrated lab with Engineering support.

Lab Support
Listed below are the acfivifies performed in accordance with ILE processes for ongoing lab support and maintenance.

- Daily Health Checks
  - — Server, workstation, network and printer status
  - — Operating system logs
  - — Application status
  - — Cleanup temporary directories
- Maintenance
  - — Daily incremental backups
  - — Weekly full backups
  - — Restore lost/missing/damaged files
  - — Manage and track trouble tickets
  - — Fix mail failures
  - — Resolve software license key issues
  - — Investigate NIS problems
  - — Address full file systems and broken file system links
  - — Identify and fix hardware and CAS software problems
  - — Interface with hardware and software vendors, as required, to resolve problems
  - — Move equipment, re-install/re-configure CAS software products and re-configure lab network based on ICRs and Engineering requests
  - — Maintain lab drawings
  - — Maintain & Test disaster recovery procedures
  - — Perform scheduled safety audits of labs

- Administration
  - — Add, remove and modify userids and file system access
  - — Manage file systems (size, location, cross mounts)
  - — Distribute software releases
  - — Attend weekly CTR /Daily status meetings
  - — Produce monthly metrics reports
  - — Monitor/Renew H/W & S/W maintenance contracts.

Managing to the Implementation Plans
Detailed schedules are produced and tracked on a regular basis at the Lab CTR. These detailed schedules are at a lower level of granularity than what is documented in the high-level Implementation plans previously discussed. They are at an appropriate level of granularity (with detailed tasks and responsibility and planned schedules) for effectively tracking and managing the work. Plans and schedules include the verification activities (e.g., audits, inspections, milestone reviews, etc.).

As necessary, tracking can cause reentry into the planning process for re-planning if a corrective action is needed or as a result of changes to the inputs used to develop the plans (e.g., change in requirements, BOM).

Factory Lab Change Control
Lab Change Management begins when the lab customer requests changes in the lab hardware and/or software configurations. Changes can range from a planned system baseline change in a test lab, to a user requested temporary change in a development lab, to an addition of a needed tool for the lab management group. The lab engineering organization participates in the change control process to maintain awareness and to provide assessments of all planned changes that affect the labs. When changes are approved, the lab change is planned and implemented. In addition to the change control process, an Infrastructure Change Request (ICRs) or Change Instrument is submitted by the support systems organization to assure that all appropriate support groups can review the proposed change and agree on the implementation approach. ICRs are maintained in a database which can be queried for status.

3400C Operational Procedure Development Process
The ERA Operational Procedure Development process is based on a cyclical process of creation, review, and revision. It will be applied for two reasons. First, operating procedures will support the technical operation of ERAs automated system components. Second, they will be used by NARA ingestion and dissemination personnel and data providers where standard procedures and tools are required in submitting ERA input data.

The process first involves obtaining appropriate operational procedure development tools and techniques for use by the procedure development team. As the ERA system components are being constructed, operational procedure development specialists will collaborate with the system technical and functional architects to develop a functional decomposition that depicts the operational functions, processes, and procedures. Roles will also be defined and procedural specifications that target individual architectural components will be integrated. Content will

then be translated within the communication medium selected for dissemination. This is done by aligning the content with designated templates, outlines, and presentation standards.

Procedure developers also create the document or other information dissemination outputs (on-line menus, screens, etc.) as a whole or section-by-section, depending on the size and complexity of the set of procedures being developed. The document/application will undergo technical reviews and peer reviews before being distributed as a draft. Once made available to reviewers, it will undergo additional reviews by customers and/or the software maintenance team as appropriate. Feedback is incorporated, final versions are produced, and the procedures are published to the user community. The document/application is managed and controlled using the document and/or configuration management tools and processes employed throughout the rest of the ERA Program. Figure 16–41, Operational Procedure Development Process, summarizes the Operational Procedure Development process.

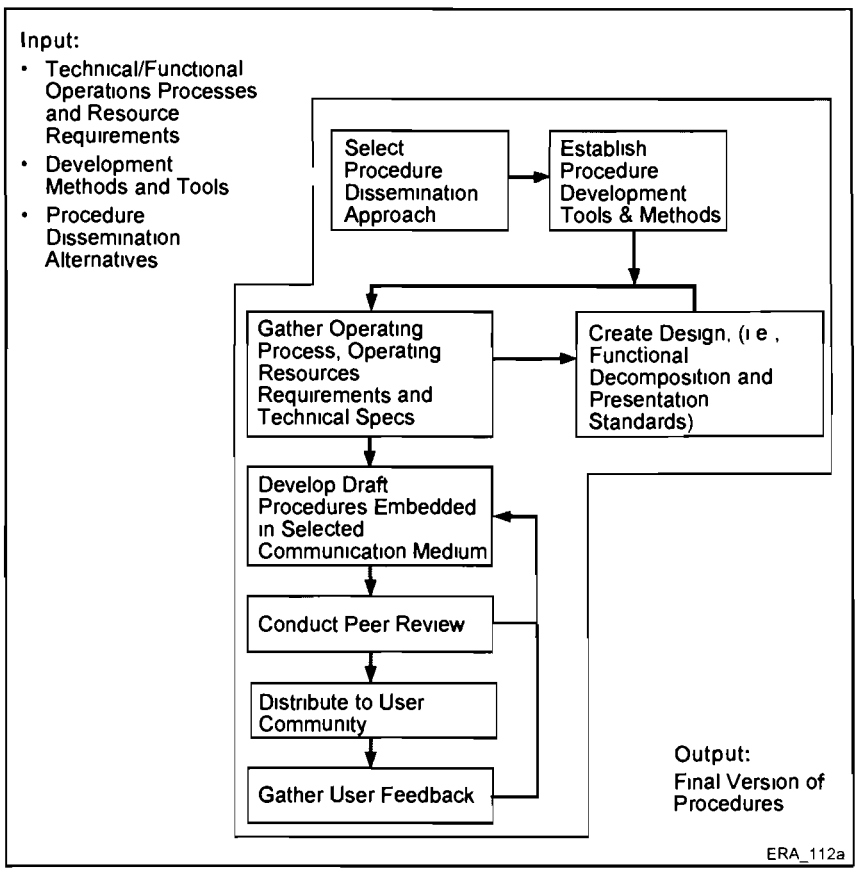


Figure 16–41. Operational Procedure Development Process

3500 Acceptance Test

For Product Acceptance Test (PAT), Operational Acceptance Test (OAT), and Installation Acceptance Test (IAT), the Lockheed Martin Team and NARA will jointly agree on the processes, roles and responsibilities, and entry/exit criteria for acceptance testing. This process description represents the Lockheed Martin Team's recommended process for Acceptance Test activities and includes Lockheed Martin Team assisting with the development and

documentation of test procedures, executing test procedures, resolving problems, and working closely with NARA personnel to achieve successful acceptance of the system.

Table 16–14, Levels of Acceptance Testing, lists the levels of acceptance test, the owner of each level, the location of the testing, and the objectives of the testing.

Table 16–14. Levels of Acceptance Testing

Testing Level	Owner	Where Performed	Objective
FAT	LM Team. NARA witness if desired.	System Integration Lab	Verify the system meets requirements. Document and prioritize defects. Collect metrics to determine test readiness at PAT TRR.
PAT	NARA with LM Team Support	Customer Acceptance Test Instance	Verify the system and user documentation meet functional requirements.
OAT	NARA with LM Team Support	Customer Acceptance Test Instance	Verify the system and user documentation are operationally acceptable to end-users.
IAT	NARA with LM Team support	NARA sites	Verify the system is installed and functioning properly.

The following list describes each of the acceptance test process steps.

- Planning and Scheduling. Test plans defining the objectives, test environment, exit criteria and other test aspects are developed early in the program. The integrated schedule indicates when each acceptance test program is conducted. Prior to the TRR or Operational Readiness Review (ORR) for each acceptance test program, a detailed scheduled is developed showing when each test procedure will be executed.
- Developing Acceptance Test Procedures. Acceptance Test procedures are written describing the required environment, prerequisites, execution steps, requirements being tested and expected results. Test scenarios and special configuration files are also developed during this step for each test procedure. Trained and qualified project personnel inspect test procedures for completeness, correctness, and conformity to project standards. For PAT, it is recommended to reuse, and update as necessary, the test procedures executed for FAT.
- Known State Testing. During this step, test personnel execute the acceptance test procedures and record the pass/fail status of each requirement. System defects found are documented along with associated requirements, if applicable.
- Acceptance Test Dry Runs. During this step, test personnel exercise the acceptance test procedures until the test procedures and the system are stable and the acceptance test entrance criteria are met. Dry runs assure that the testers, system, and support assets are available and prepared for formal acceptance testing.

- **Readiness Review (TRR/ORR).** The Lockheed Martin Team hosts and conducts TRRs and ORRs with NARA to review the results of dry run testing against entrance criteria to determine whether the program is ready to begin formal acceptance testing. These reviews assure that all stakeholders understand the state of the system and its preparedness and assure that spares and necessary support equipment are available.
- **Run-for-Record Testing.** This step is the formal execution of base-lined Configuration Management (CM) controlled test procedures using base-lined Configuration Management (CM) controlled software builds installed in a base-lined CM controlled test environment. The tests are executed by the Lockheed Martin Team witnessed by quality assurance, and NARA representatives.

For each test, a pre-test briefing is conducted describing the purpose and expectations of the test and a post-test briefing is conducted reporting the results. Deviations from, and redlines to the test procedures are annotated and recorded in the test reports. Defects discovered during testing are also documented in the test reports and then recorded in the defect database. Test artifacts are retained by CM. The test exit criteria are established by a base-lined Test Plan. Final test reports summarizing overall results, exit criteria metrics, and issues are presented at the conclusion of formal test.

At the conclusion of formal test runs, NARA and the Lockheed Martin Team review the overall test results and agree on whether the milestone is complete or determine what action must be taken prior to closure. The formal test program is completed when the exit criteria agreed to by the Lockheed Martin Team and NARA is met.

3600A System Training Process

The training process for the ERA project, shown in Figure 16–42, ERA System Training Process, is comprised of strategy, planning, and delivery components.

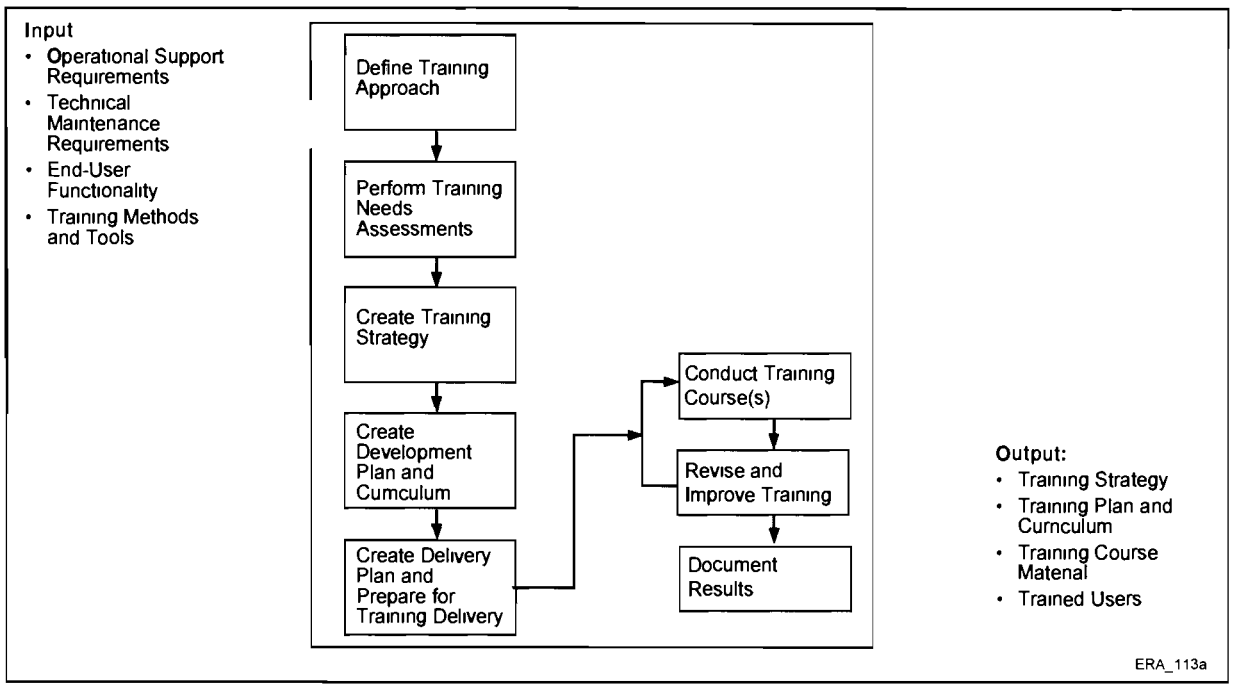


Figure 16–42. ERA System Training Process

The strategy component is used to set the direction for how, when, where, and by whom training will be delivered. The analysis of the existing training capabilities, technology infrastructure, and needs of the end-users is utilized to drive the direction of the strategy. Once the strategy is created, the planning component begins, including the development of the training plan and curriculum.

The training plan is built to detail the development and delivery of the training, which aligns with the chosen training strategy. The plan enables the NARA to make informed decisions about the appropriate resources required to provide training to the organization, and to communicate to the project team and the organization about how and when training will be delivered. During the planning stage, the curriculum is established to guide the training development.

Lastly, the delivery component is fulfilled through the execution of the training course(s). This is the process of transferring new knowledge to NARA employees, in an effort to bridge the gap between their present level of understanding of a new skill or concept to the desired outcome of skills and behaviors. The training delivery contents are derived from the training plan and curriculum, and address the issue of developing and nurturing NARA employee skill and competency development. The completion of training delivery maximizes the likelihood of sustained behavioral change, which is essential to the ERA project's success.

3600B Organizational Change Management Process

The ERA initiative will require much more than "good planning" and "the right technical solution." Large-scale transformation initiatives present great opportunities but also pose significant implementation risks. Many of these risks are "people-related" which must be managed for successful implementation.

Our change management activities support and supplement planned PMO activities and span the life of the project. Design, development, deployment, and support of ERA requires a significant focus in these five key change management strategies shown in Figure 16–43, Organizational Change Management Framework:

1. Assess and monitor organizational risk associated with the transformation
2. Mobilize and align leaders to establish agreements on project direction and issues as well as leverage assets and strengths of individual leaders throughout the initiative
3. Engage and communicate with affected individuals and groups both within NARA and across the transferring entities in the Federal government to promote understanding and acceptance of the initiative through interactive communications and promotional campaign activities
4. Prepare and equip NARA's workforce to operate effectively in the new environment as each increment is released by carefully understanding workforce impact and designing and delivering multi-channel training and development activities
5. Address organizational impacts by realigning jobs, performance management measures, and organizational structures.

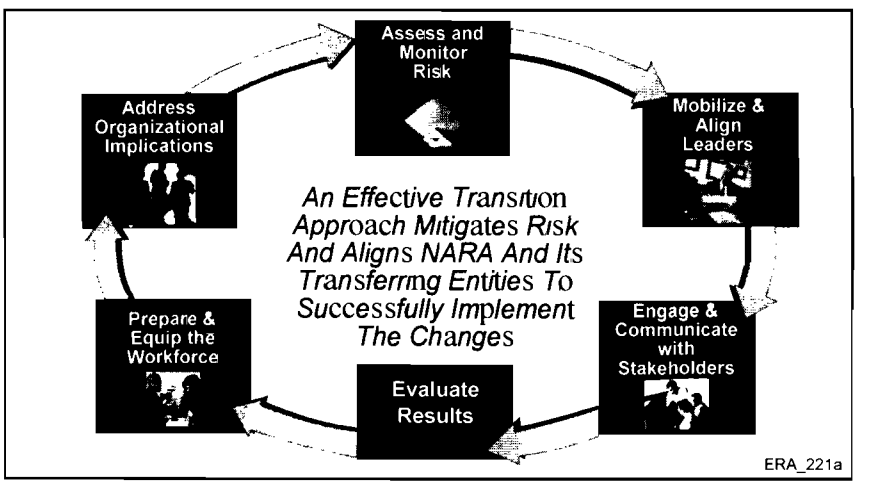


Figure 16–43. Organizational Change Management Framework

To successful implement an initiative such as ERA, NARA will need to engage not only the right people in NARA, but will also need to help create a community of records management leaders from the various transferring entities. An important element of change management is to get the right people together to address the implementation issues and help them build agreements that lead to action, all in an effort to increase the probability of employees such as archive specialists, technicians, librarians, and other key staff actually using the new system. Implementations of new solutions are often filled with risks that are overlooked by teams implementing technological, organizational, or process solutions. It is possible that users, staff, and external stakeholders may not easily adapt to new technology or process changes.

Specifically, in applying the five change strategies, the Lockheed Martin Team will:

- Identify and address people risks up front;

- Drive early agreement among the various component leaders on the key aspects of the implementation process and build their commitment and sponsorship;
- Leverage individual leaders and their strengths throughout the ERA process;
- Develop a strategy, needed infrastructure, and implementation-based responsibilities for a community of extended stakeholders;
- Provide tools to the limited resources responsible for driving change across multiple locations;
- Emphasize stakeholder events to drive understanding and acceptance both internally and to transferring entities;
- Make formal communications newsworthy and consistent in their message;
- Develop training and workforce strategies early enough to ensure readiness;
- Anticipate and address the organizational implications of ERA from the new system and the reengineered processes, such as impacts to performance management, and pay/incentive programs;
- Measure progress: "Are we winning over the hearts and minds of those most affected"; and
- Align with existing PMO change and communication activities.

Organizational Change Management Approach and Activities
A graphical depiction of our change strategies and proposed deliverables is included in Figure 16–44, Anticipated Change Management Activities by Project Phase.

Project Launch
Project Launch sets the stage for the user acceptance of the upcoming deliveries. During the analysis and design phase, the emphasis is on the overall ERA program. With each increment, we refine the change management plan to incorporate lessons learned and to focus the change effort on the set of capabilities to be delivered. As shown in Figure 16–44, there are six key activities in the overall project launch; the extent of these is governed by the scope of the increment and the activities of any previous efforts.

1. Stakeholder Analysis. Through the Stakeholder Analysis activity, we work with the NARA PMO representatives to identify key people and groups throughout NARA and elsewhere in the Federal Government who can affect the success of the initiative and analyzes anticipated expectations and reactions to initiative. These stakeholder groups can be key decision makers or process owners. Although these people may be at all levels of the government, often most of the stakeholder groups range from division chiefs to bureau directors to assistant secretaries. This activity enables the development of appropriate plans to engage stakeholders and meet expectations. Ultimately, the information developed in this activity is used in a number of other activities.
2. Organizational Risk Assessment. The Organizational Risk Assessment consists of a set of interviews, focus groups and/or surveys with stakeholders at various organizational levels to identify potential "people-related" issues that could thwart or impair the successful implementation of the ERA. This assessment includes people both inside of and outside of NARA. Our approach emphasizes one-on-one interviews with key executives – such as the Archivist and Deputy Archivist, Office Directors, initiative leaders, and possibly site Directors – as well as focus groups with employees at various

levels. Once the data gathering activities are complete, we analyze the feedback, summarize findings into key themes, and then recommend risk mitigation actions to the program director.

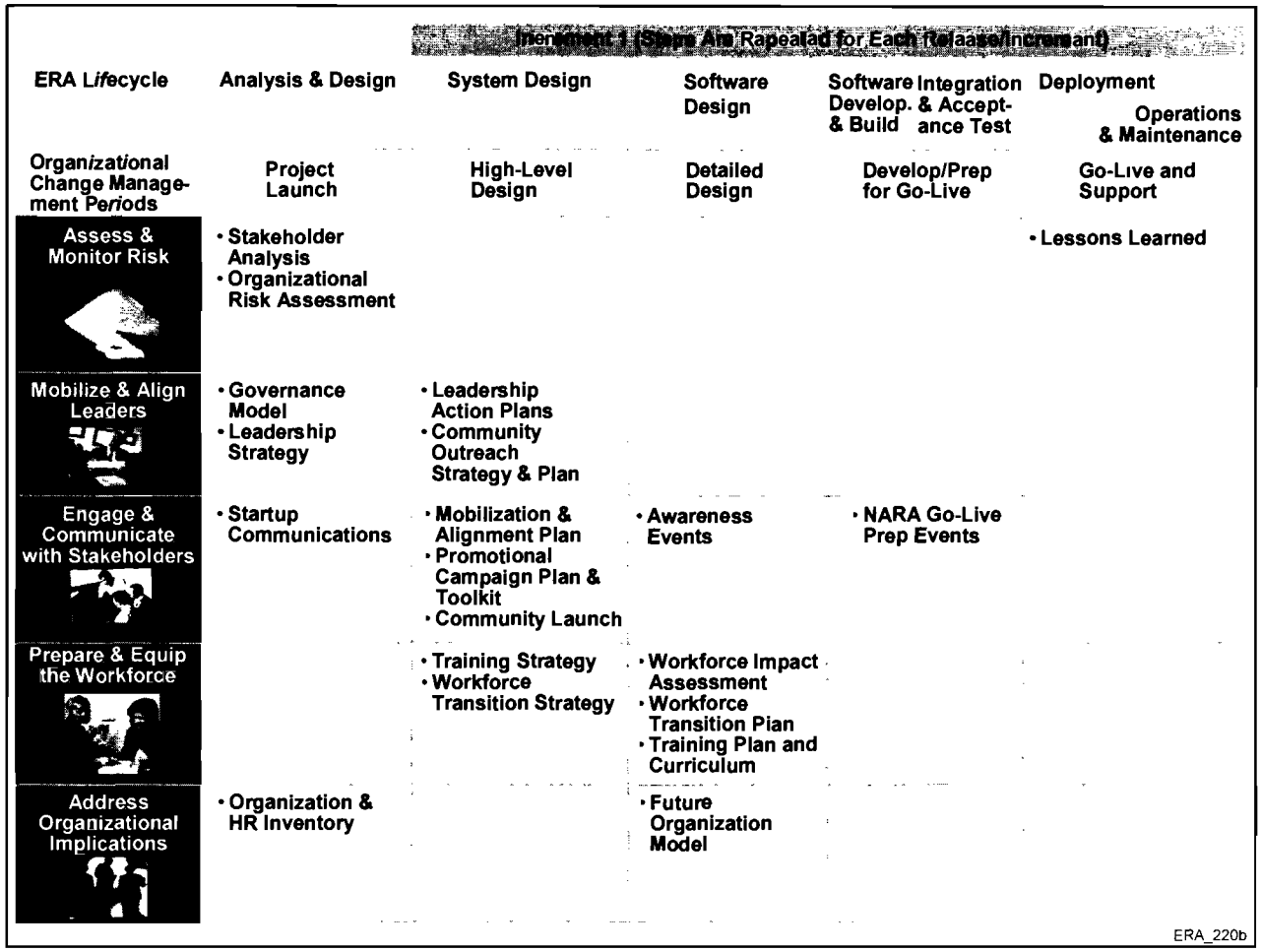


Figure 16–44. Anticipated Change Management Activities by Project Phase

3. **Governance Model.** The Governance Model provides clear guidelines for program issue escalation to the steering committee, and creates, early in the program lifecycle, decision rules to guide, simplify, and speed decision-making on program issues. It also lays the initial foundation for engaging other agencies and is an important input into the Community Outreach Strategy and Plan.
4. **Leadership Strategy.** The Leadership Strategy builds upon the results of the Organizational Risk Assessment interviews, the Organizational Risk Assessment, and the Governance Model. Using the feedback from Organizational Risk Assessment and the foundation of the Governance Model, the change team conducts an interactive session to help key leaders focus attention on critical challenges and mitigation strategies while building a guiding coalition for ERA.
5. **Startup Communications.** The Startup Communications activity provides a positioning statement for the ERA initiative and leads to written communiqués to both internal NARA and external audiences to announce start-up of initiative. This helps inform key stakeholders who need to know about ERA and prepares them to contribute to the initiative in these early defining phases of the effort. We coordinate these communiqués

with the designated ERA PMO representative to maintain compliance with the non-disclosure requirements.

6. **Organization and HR Inventory.** The Organization and HR Inventory activity describes how current organization, jobs, and Human Resources (HR) processes and practices support or hinder the achievement of agreed on future business objectives. This activity builds a relationship between the Lockheed Martin Team and NARA HR organization, especially with both the HR leadership and labor relations leaders.

High-Level Design

During the high level design period developers to ensure that the system considers the human aspect of the deployment. As shown in Figure 16–44, there are seven key activities during the high level design; the extent of these is governed by the scope of the increment and the activities of any previous efforts.

1. **Leadership Action Plans.** Leadership Action Plans provide a structured approach to Executive Coaching that result in one-on-one action planning contracts with the leaders of the ERA initiative. The Leadership Action Plans help individual leaders leverage personal strengths to promote successful implementation of this particular initiative. Additionally, the plans help key leaders develop insights and skills that are transferable to their ongoing leadership roles.
2. **Community Outreach.** The Community Outreach activities outline the infrastructure needed to create a community of records management leaders in the various transferring entities. The activities then describe a series of interactive events to tirst launch this community as a viable forum of interested subject matter experts and then engage them in specific activities needed to successfully implement the ERA initiative.
3. **Mobilization and Alignment Plan.** The Mobilization & Alignment Plan activities provide a detailed road map of the various change actions that enable key stakeholders to work together during the ERA initiative. It presents a graphical depiction of those activities that need to be orchestrated to build understanding and agreements. It also describes the major events that will be conducted and presents opportunities to collect valuable feedback needed to refine the change activities over time. Overall, this activity provides a roadmap tied to the critical path of the project so that live events and written communiqués are properly sequenced with other project milestones. This approach also highlights how these events will be conducted while managing limited resources across multiple locations.
4. **Promotional Campaign.** The Promotional Campaign activities outline the branding approach to promoting ERA, incorporating multi-media communications, and synchronizing with the live events depicted in the Mobilization & Alignment Plan. The activities also describe the various feedback mechanisms (which might include event-based feedback cards and electronic "pulse" surveys given to selected stakeholders) that will be used throughout the initiative.

The promotional campaign planning provides several concrete communications tools targeting different audiences. This toolkit is then provided to leaders of stakeholder groups so that they can communicate about ERA in a consistent manner. This toolkit will include:

- A standard slide deck that describes the new ERA program, its objectives and expected benetits
- A set of Frequently Asked Questions (FAQs) that managers and employees can use
- A feedback card that can be used at live events conducted by the change team or managers within the organization.

1. Community Launch. The Community Launch is a series of events based on the Community Outreach Strategy. It starts with an interactive kickoff event that orients and on-boards identified members of the Records Management Community whose involvement is needed to make the implementation successful. The initial launch will describe the series of activities in which members of the group will need to participate. The group will then be reconvened when specific implementation-based tasks need to be addressed, including process definition, communication within their agency, planning for training and assessing deployment readiness by agency.
2. Training Strategy. The Training Strategy assesses the type of training required to prepare and equip employees to function successfully with the new system and processes. It also describes approaches to be used in developing and delivering required training such as E–learning, self-study, and classroom options.
3. Workforce Transition Strategy. The Workforce Transition Strategy provides a high-level strategy for moving people into new organization structure and jobs. This activity is performed in very close collaboration with NARA HR leadership.

Detailed Design
During the detailed design period leading up to Critical Design Review, the Lockheed Martin Team furthers the readiness of the community of users to accept the change provided by ERA. As shown in Figure 16–44, there are tive key activities during the detailed design; the extent of these is governed by the scope of the increment and the activities of any previous efforts.

- Awareness. The Awareness activities include coordinated events to enhance managers' and employees' understanding about ERA and how it will impact them. Depending on the Mobilization and Alignment Plan, these events may take the form of Q&A sessions, "town meetings", web-enabled meetings, etc. Overall, they will include opportunities for:
  — Key leaders to speak to employees about the importance of the initiative and the organization's commitment to ERA
  — Attendees to learn about the initiative
  — Attendees to provide live feedback about their concerns as well as their views on how to make the initiative successful

  At the conclusion of events, attendees will provide written feedback on feedback cards as outlined in the promotional campaign plan and the feedback will be assessed.
- Workforce Impact Assessment. The Workforce Impact Assessment activities provide a high-level assessment of how the expected process and system changes will impact employees. It provides NARA leadership with an understanding of how the increment will impact archive specialists, technicians, and other key staff.
- Workforce Transition Planning. The Workforce Transition Planning activities provide a detailed plan to address the organizations and jobs that will be impacted by the ERA

deployment. The activities determine any actions required to reassign, out-place, or hire employees due to projected ERA system operations needs.

- **Training Plan and Curriculum.** The Training Plan and Curriculum activities provide a tactical plan to determine how training will be developed and delivered, when, where, and by whom. Training materials and a curriculum will be developed so that NARA trainers can be trained and then deliver training to end-users.
- **Future Organization Model.** The Future Organization Model activities describe a conceptual future organizational design based on anticipated system and process changes as well as identify any changes to HR policy and processes that will be required to support the ERA solution.

Develop/Prep for Go-Live

During the system implementation and software integration and test, the Lockheed Martin Team assists with the preparation for the system deployment. As shown in Figure 16–44, the activities during this project phase are those in preparation for the go live event (for increment 1, this is the Initial Operational Capability; for Increment 5, this is the Full Operational Capability). The NARA Go-Live Preparation activities center around a workshop that prepares managers and supervisors to speak with employees about individual job impacts and changes in responsibilities. The activities help managers to understand impact of change on their employees and themselves. The managers are then better equipped with specific information to meet with their employees.

Go-Live and Support

The go-live period starts with the deployment of the capability to the field and continues as the system operations community and other stakeholders accept the changed environment. As the system goes live, we assist the community of stakeholders with its acceptance. We also document Lessons Learned to improve the deployment of future increments.

4000 ERA Solution Development

The product development processes provide the means to assemble the total ERA solution. Individual products (Ingest, Dissemination, etc.) are built and integrated together to provide the functionality required by NARA. The processes focus on 'control'; they include interface definition and control, product integration and support, workflow management and increment/ release definition, all of which contribute to a controlled development and release of the final solution.

4000A The Interface Management Process

The Interface Management Process, also known as Interface Engineering (shown in Figure 16–45, Interface Engineering), covers interface identification, specification, impact analysis, and validation and verification. Internal interfaces are recorded in software design specifications and in code specifications. Development team members collaborate as needed to define internal interfaces. Once the internal interface definitions are agreed upon and documented or coded, an inspection is held to review the final result and the inspected artifacts are configuration managed and promoted to the Team Portal.

External Interfaces are documented in an Interface Control Document (ICD) and designed with the following architectural principles: modularity, portability, minimized coupling, assured information delivery, throughput, and accuracy. All external system and agency system stakeholders are involved in the interface coordination process to assure system integrity and accessibility. This expanded agency participation in the ICWG facilitates selection of standards and protocols that enable interoperability with the entire ERA user community.

The primary objective of the ICD is to define in detail the interfaces between the NARA ERA system and NARA legacy systems, systems of other government agencies which provide records to NARA for archiving, and other external systems. The ICD provides information required to develop the interface. An ICD may be provided by NARA or a representative of an external system, in which case the Lockheed Martin Team verifies hs sufficiency. If an ICD to an external system does not exist, it is developed by the ICWG. The ICD development and maintenance process includes the following steps:

Analyze and Refine Interface Requirements. The interface requirements specifications are documented and presented during the System Requirements Review (SRR). The Lockheed Martin Team collaborates with NARA as needed to define these requirements.

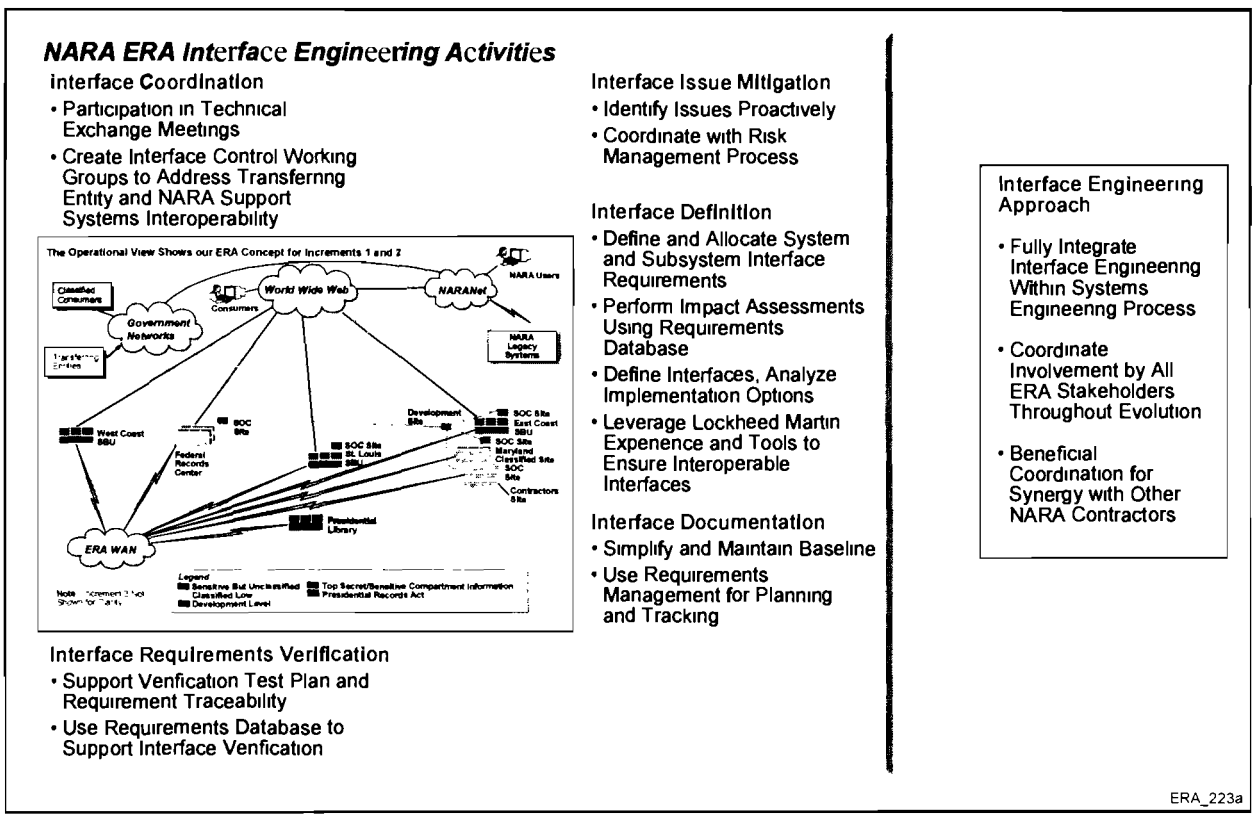


Figure 16–45. Interface Engineering

Collect Interface Information. Interface documents may be supplied from NARA, from other interfacing legacy system owners, or from equipment vendors. When interface data is not readily available, engineering analysis is performed to define the interface data.

- **Analyze the Collected Interface Data.** Discrepancies, ambiguities, or incompleteness of detail may be discovered during analysis of interface collected from various sources. These items are resolved with NARA, the external system owner, or equipment vendors as appropriate. Collecting, analyzing, and verifying interface data are performed iteratively until there is agreement on the interface definitions.
- **Compare Collected Interface Data with Live Data.** If interface equipment is available at a customer or vendor site, a site visit is arranged to record live data and document system characteristics. The live data is compared with the interface data collected from documents. Any discrepancies or updates are resolved with the customer.
- **Produce and Inspect the Interface Control Document.** The interface data and operational concept are used to develop the ICD. The ICD contains information such as interface protocol information, message names, message formats, data items within a message and their corresponding data types, and the range of valid values for each data item. The ICD is inspected to ensure its accuracy and completeness.
- **ICD Change Control.** The ICD is usually base-lined after customer approval at SDR. Once the ICD is base-lined, proposed ICD changes follow the same change control mechanisms as changes to any other program base-line. Changes are coordinated through the Engineering Review Board and Configuration Control Board to assure that interfaces are properly allocated to the appropriate increment and release.

4000B Product Integration and Support Process

Product integration and support, illustrated in Figure 16–46, Product Integration and Support Process, addresses the activity to integrate the hardware and software components of the system and resolve issues associated with the integration. There are three components to be integrated: (1) commercial hardware; (2) developed software; and (3) commercial software with related developed software adapters. This process addresses the integration of both types of software onto the commercial hardware platforms.

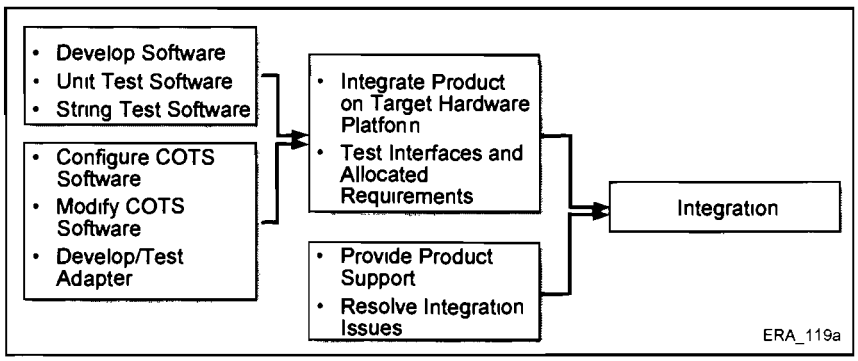


Figure 16–46. Product Integration and Support Process

Commercial software product integration requires configuration of the commercial software products to tailor them to execute their intended function in ERA. In many cases, software adapters are required to implement the interfaces to commercial software products. The adapters will be tested with the configured commercial product on the target commercial hardware platform.

Developed software is tested and/or integrated in increasing levels of completeness, from unit testing through subsystem through tread testing. The software is loaded on the target commercial hardware platform for testing.

The testing confirms that the product meets its allocated requirements and can support the interfaces required for system integration using test tools and simulators.

The support aspect of this process is the continued resolution of integration and system operation problems that are against the product.

4000C Workflow Manager Process

The workflow management engineering process, shown in Figure 16–47. Workflow Manager Process, captures how NARA users operate the ERA system. The first step of the process is to capture the current workflow that NARA uses to perform its archival duties. In addition, use-cases for the system are built that reflect how the users interact with the system. This data is used to generate a set of work flows that are turned into a simulation model. The NARA workflow team, including key subject matter experts, reviews the simulation model of the workflow and generates comments. The modeling team and engineering team iterate the workflow until they reach the correct workflow. A set of requirements and design data are captured from the simulation model and used to generate the actual implementation of the workflow management product. This product is tested and validated by the users.

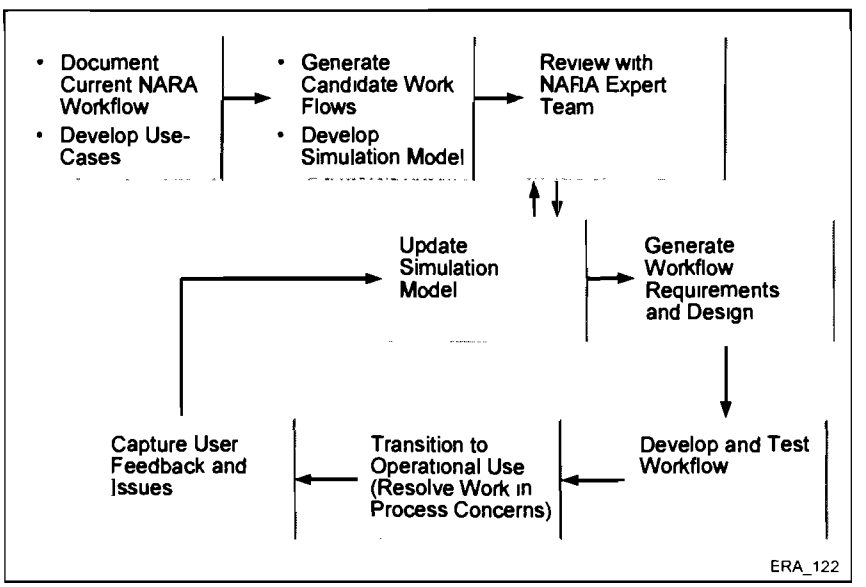


Figure 16–47. Workflow Manager Process

Issues identified are fed back into the modeling stage for the next possible incremental release for implementation. Over time, NARA is provided access to the workflow modeling tools to generate the requirements for the next increment release cycle.

4000D Product Design and Build

The individual ERA products are assembled during the Product Design and Build process. Each of the Integrated Product Teams (IPTs) has the responsibility for further refining the ERA requirements captured during the execution of the ***3200A System Functional Requirements Process*** into product specific System Requirements Specifications (SRSs). The teams follow the architecture design processes encapsulated in ***3300A Systems Architecture Design Process*** and the ***3300B Data Architecture and Design Process***, and the high level guidance given through the Systems ConOps and the Systems IPT to define a product level architecture and design that complies with ERA standards and goals. They use the ***3100G Software Engineering Process*** and the ***3100I COTS Software Process*** to build the software portions of their products. The ***3100D Peer Review Process*** provides the guidance for the peer reviews conducted after the software products are built.

As each portion of a software product is built, the IPT prepares and conducts unit and string tests to validate its work. The tests check for coding errors (invalid commands, unexpected outputs, logic errors, security flaws); the defects are recorded for future process improvement activities. The Systems IPT, with NARA's concurrence, determines the acceptable threshold of defects; too many defects and the software component must be re-coded and re-tested, while too few defects may call for a closer examination of the code/tests/results. The software is placed under configuration control at the end the design and build process.

4600 Increment/Release Definition Process

The Increment/Release Definition Process provides the means for managing release activities within increments.

Management of the content of increments and their releases requires balance between a number of factors. During the analysis and design phase, a structured functional plan for content of all increments and releases is developed. This plan balances resource demands and results in an orderly build up of the system. However, each increment and release plan is reassessed at the start of the engineering activity for the release cycle. It considers the following:

- New requirements identified by NARA,
- User feedback from operational use,
- Evolution of technology or end-of-life of current system elements, and
- Software maintenance problem reports.

All of these factors are prioritized within the development bandwidth of the engineering team, funding constraints, and schedule constraints to arrive at a cohesive plan. Any changes to the original architecture and design material need to be processed and approved to continue with the increment release engineering cycle. The Team conducts increment/release level Systems Requirements Reviews (SRRs), Preliminary Design Reviews (PDRs), and Critical Design Reviews (CDRs) with NARA participation before proceeding with development.

An Increment Planning Session, which consists of working group meetings, process improvement activities, a technology demonstration and requirements refinement activities, is scheduled near the end of each increment. This provides NARA, stakeholders and the Lockheed

Martin Team an opportunity to review the activities performed during the previous increment, assess new technologies for their applicability in future ERA releases and determine any requirements changes that might be needed.

5000 Deployment

5100A Technical Review Process

The Technical Review Process (TRP), illustrated in Figure 16–48, Technical Review Process, is responsible for identifying the sequence to install components at specific sites and for completing specific design drawings. Primary participants include the ERA Chief Engineer, NARA IT Repreścntafives, and the Deployment and Operations IPT. This process begins the overall Deployment Process. User-specific technical configurations are inspected and reviewed with site-specific IT representatives. Communities of interest (COIs), defined as organizations or groups of end-users that are associated and/or connected via common communications systems, are identified. The TRP is also responsible for retrofits of exisfing deployed sites. Plans are identified and reviewed to ensure that as hardware and software are retrofitted to existing sites that all stakeholders are identified and all technical aspects of the retrofit have been identified.

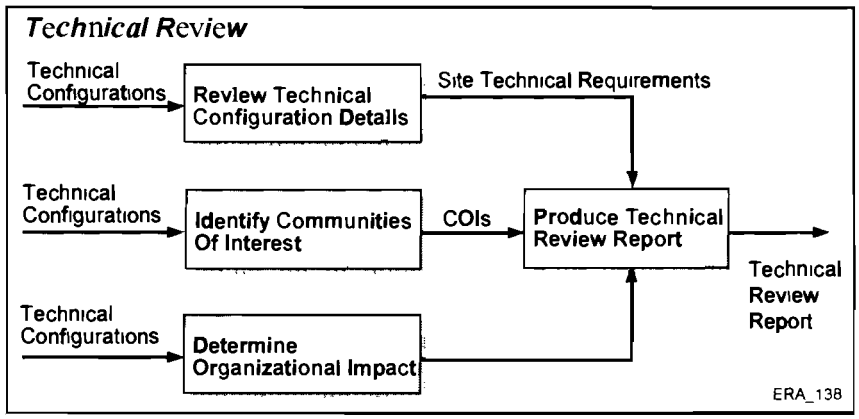


Figure 16–48. Technical Review Process

Services, quality of service levels, and technical details such as number of ports and IP addressing scheme, are identified and documented. Site security requirements are identified and organizational impact is assessed. Results of all reviews are synthesized into a Technical Review Report.

5100B Deployment Communication Process

Whenever a retrofit for an existing deployed site is required, extensive communication is required to ensure that all of the stakeholders are informed of the changes that will be occurring at their site. A retrofit is defined as when COTS hardware and software, or application software are being replaced, installed, or upgraded. This retrofit would occur to accommodate additional functionality or additional resource requirements. Regardless of the reason for the retrofit, communication to all stakeholders is required. The Lockheed Martin team will communicate with NARA, as well as the local sites(s) to ensure that all of the stakeholders are well aware of the changes being implemented at their sties. A formal "retrofit communication plan" will be developed detailing all of the activities that will be required to retrofit a given site and ensuring

that all of the stakeholders are briefed on the potential impacts as well as the schedule and timeline of the upgrades. Once all of these plans and processes have been completed, the retrofit of the deployed site(s) will be performed.

5200A Site Deployment Plan Process

The Site Deployment Plan Process is responsible for producing the Site Deployment Plan which includes a detailed deseriptfon of the work to be performed to prepare a site for occupancy. Primary participants include the ERA Chief Engineer, NARA IT Representatives, Site Representatives, and the Deployment and Operations IPT. The process, illustrated in Figure 16–49, Site Development Plan Process, begins with the preparation of a Site Installation Plan that uses site survey information gathered during the Site Assessment Process. In addition, the Site Installation Plan outlines the site design, the tasks, and procedures for the ERA site deployment, responsibilities of all parties, authorizations, demarcation assignments, and the schedule of deployment activities.

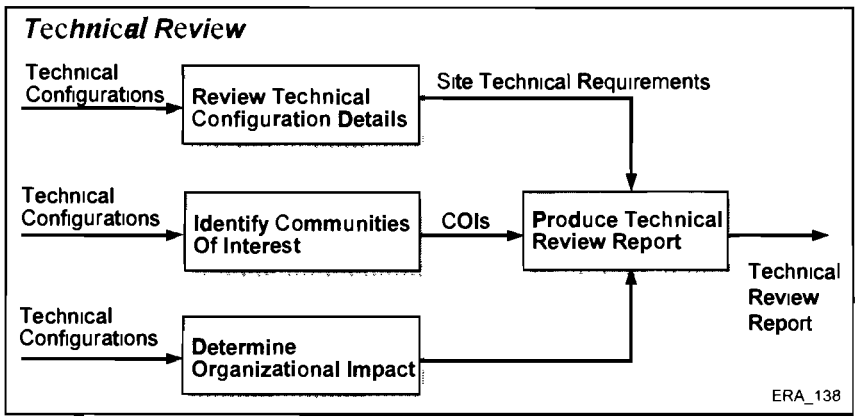


Figure 16–49. Site Deployment Plan Process

While the Site Installation Plan is being developed, Site Design Engineering is performed. This includes Facility Engineering to determine the loading conditions and structural limitations, Direct Connectivity Engineering for inter-site connectivity, and Pathways Planning to specify cabling types, lengths. endpoints, patch panel locations, distribution frame locations, and line equipment.

Site Design Drawings are prepared and placed in a configuration management database. The drawings include Topology drawings, Logical and Physical Site Design, Protocol Design, Wiring and Connectivity Diagram, Floor Plan, Rack Elevation, and Chassis Diagram. The contents of the database will be delivered to NARA as CDRL L44 upon contract completion.

Outputs of these steps are collected and used to produce the Site Deployment Plan, which is then used to produce the site's preliminary Disaster Recovery Plan. Both plans are reviewed with NARA and revised if necessary to gain their concurrence and acceptance.

All of these process steps will be followed again in developing a Retrofit Site Deployment Plan for all existing deployed sites.

5200B Equipment Acquisition Process

The Equipment Acquisition Process, illustrated in Figure 16–50, Equipment Acquisition Process, is responsible for the acquisition of equipment and its delivery to the appropriate facility. Primary participants include the Deployment and Operations IPT, NARA IT Representatives, and ERA Procurement Engineering staff. It begins with item acquisition where purchases are made through a procurement process as the result of maintenance planning and operational needs.

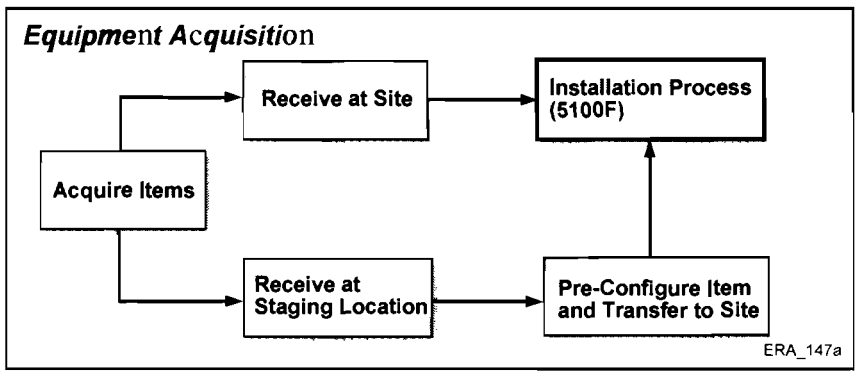


Figure 16–50. Equipment Acquisition Process

Items can be shipped directly to the site where they will be used. The Installation process is executed to make them operational. Alternatively, the items can be shipped to a staging are where they may be pre-configured for use at an ERA site and possibly stored until they are needed. Once transferred to an ERA site, they are put through the Installation process.

This same process will be invoked on the procurement of hardware and software for retrofitted sites.

5200C Installation Process

The Installation Process is responsible for delivering operational hardware and software environment at an ERA site. Primary participants include the Deployment and Operations IPT, Site Representatives, ERA Engineering staff, and NARA IT Representatives. When the site is ready for occupancy, the hardware is moved in to the site and installed. This includes bolting equipment to the floor, connecting the power, and cabling. Installed equipment is entered into the configuration management database. When the hardware is functional, the operating software is installed and documented in the configuration database. The network and computing platforms are tested and allowed to run for the burn-in period. Upon successful completion of these acceptance and checkout tests, the hardware and operating software is commissioned.

The site accepts delivery of the application and management software, which is then installed. The configuration is tested and receives NARA's concurrence and acceptance. Migration to an operational status is performed at a preplanned scheduled date and time. This process is illustrated in Figure 16–51, Installation Process.

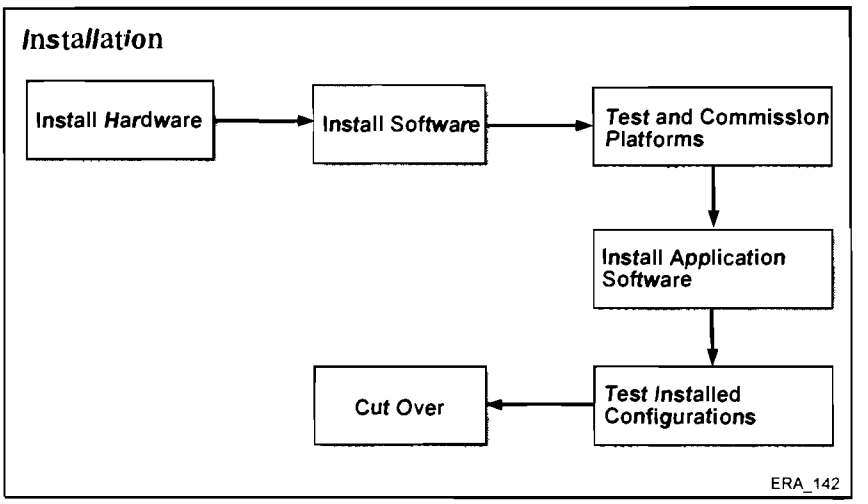


Figure 16–51. Installation Process

This same process is followed for the retrofit existing deployed sites.

5300 Retrofit Process

The Retrofit Process, illustrated in Figure 16-52, Retrofit Process, provides the means for upgrading or changing deployed ERA site instantiations. The process may be initiated as a result of:

- Hardware or software that has reached its 'End of Life'.

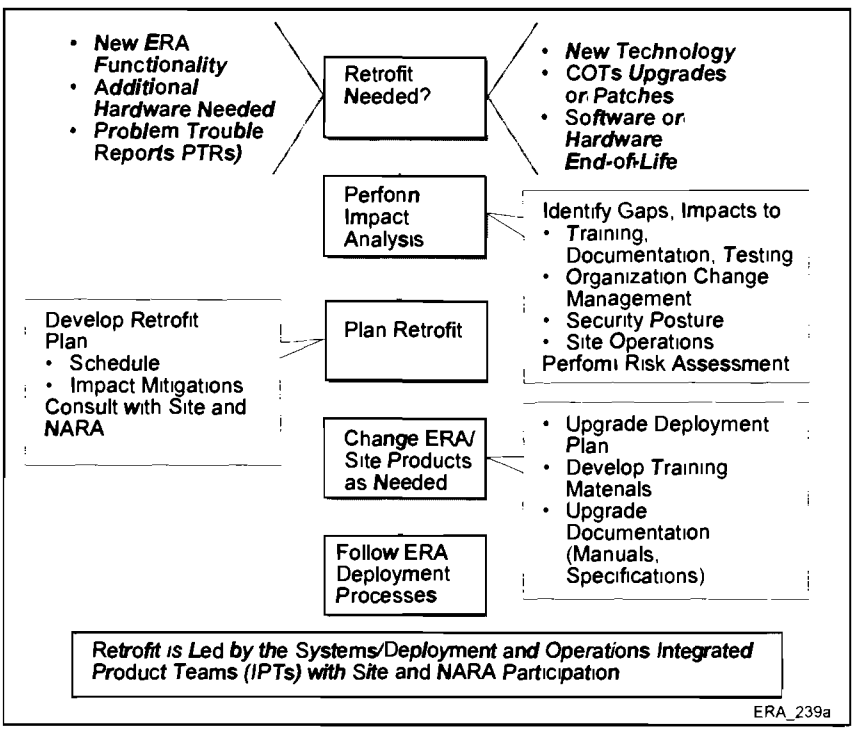


Figure 16-52. Retrofit Process

- Additional hardware, such as disk storage, servers, telecommunications equipment is needed to keep up with growing ERA processing demands. The Lockheed Martin Team will analyze the Technical Performance Measures (TPMs) selected during the Analysis and Design phase to determine when the additional resources are needed and will present this information to NARA during the Monthly Status Reviews (MSRs).
- The ERA product is maturing; new functionality is available.
- New technology is available; NARA and the Lockheed Martin Team have jointly agreed to perform technology refresh for the program.
- Vendors have released COTs upgrades or patches, including security patches, which need to be incorporated to maintain vendor warranties or a responsive security posture.
- Fixes for Problem Trouble Reports (PTRs) for the instantiation are available. To minimize site impact, non-critical PTRs fixes will be installed in 'patch releases', containing multiple PTR fixes; the Lockheed Martin Team and NARA will define the criteria for non-critical PTR installations during the Analysis and Design phase. Critical PTRs will be installed on an emergency priority basis.

A list is maintained under configuration management control for each deployed site, showing the hardware and software installed and any customization that was performed. This information is analyzed with the new requirements and used by the Deployment and Operations Integrated Product Team (IPT) to plan the instantiation upgrade. The retrofit plan contains, at a minimum (1) the approach to be used to minimize operational impact for the site; (2) a schedule for performing the work; (3) the upgrades and the rationale for performing them; (4) impacts, including any re-certifications that need to be performed, addifional training needed, additional testing needed and documentation changes and (5) risks and mitigations. The plan is presented to site personnel and NARA; a consensus for the retrofit approach is reached, and the retrofit information is added to the site deployment plan. The actual deployment of the upgrade follows the standard ERA deployment process.

5400 Site Assessment Process

The Site Assessment Process, illustrated in Figure 16–53, Site Assessment Process, is responsible for determining the space available, facilities and environmental conditions, security, current equipment and configuration, cabling, and other considerations as specified by users. Primary participants include the ERA Chief Engineer, NARA IT Representatives, Site Representatives, and the Deployment and Operations IPT. The process is carried out in three general steps: (1) Identify floor space, (2) Perform site survey, and (3) Perform pathways survey. Site assessment information gathered at the larger SBU sites will support the planning for the classified, Federal Records Center and Presidential Library facilities, resulting in on the efficient use of NARA resources and permitting a rapid deployment schedule.

In identifying floor space, the survey team requires rack space and floor plan footprints based on physical dimensions of the equipment. Floor owner sources will be identified and a set of priorities will be established. Within each of the owned spaces, the survey team will use floor space requirements and rack elevation drawings.

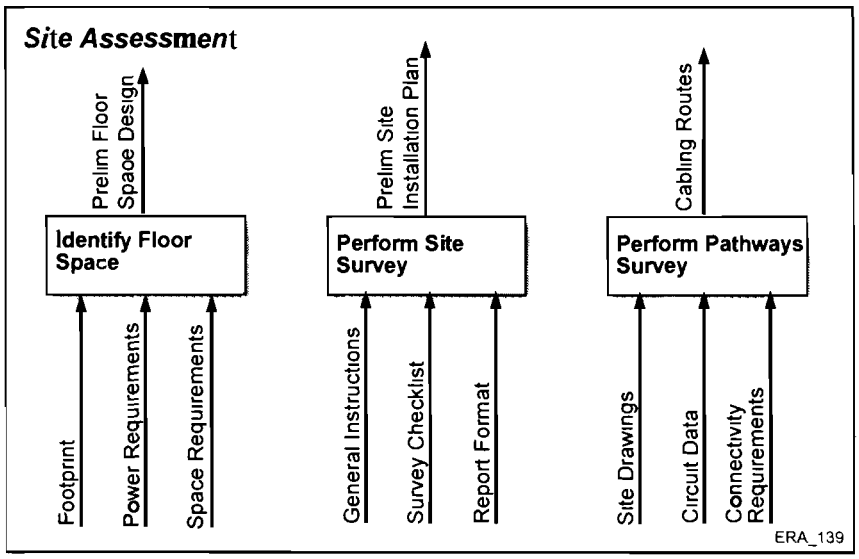


Figure 16–53. Site Assessment Process

Site surveys identify site preparation work requirements, space requirements, any other related issues, and any specific assistance required from the Govemment. The survey team collects the following information: space allocations, environmental conditioning, power, grounding, pads, external enclosure, and floor space, special operational, facility, and security conditions, and site drawings. Checklists are completed and initial site preparation work requirements are identified.

Pathway surveys will be conducted by the survey team to identify and determine the cable routes between identified equipment locations. Existing available tiber optics will be tagged as a priority for use between operational sites and user locations. Cable pathways between sites will be identified so that cables can be run between locations without available cabling.

This process will also be utilized when sites are being retrofitted with new hardware (e.g., storage devices, servers, and telecommunications equipment). Similar activities of allocating floor space, cable runs, and environmental considerations will be identified and a formal assessment will be performed before the actual retrofit occurs.

5500 Physical Build Out Process

The Physical Build Out process, illustrated in Figure 16–54, Physical Build Out Process, is responsible for the fitting up of a site and ensuring it is ready for occupancy. Primary participants include the ERA Chief Engineer, NARA IT Representatives, Site Representatives, the Deployment and Operations IPT, and Construction Contracting staff. It begins with the design, contractor bidding, budget and approval procedures. Design is taken from the Site Deployment Plan. Functional input from the client/tenant sets the design goals, weighing factors of building size, availability of local utilities and services, building systems performance, improvement cost, and flexibility. The Construction team will produce an approved set of design documents and project cost estimates.

The Construction phase will accomplish the building and site improvements per the approved design. The scope of improvement may be the upgrade or renovation of an existing property or

the development of new buildings. Key project drivers will be cost containment, quality of design and workmanship, safety, and schedule compliance. The facility must be designed and constructed to meet or exceed established standards of operational availability, security, robust construction, ability to expand or relinquish, and other superior performance characteristics.

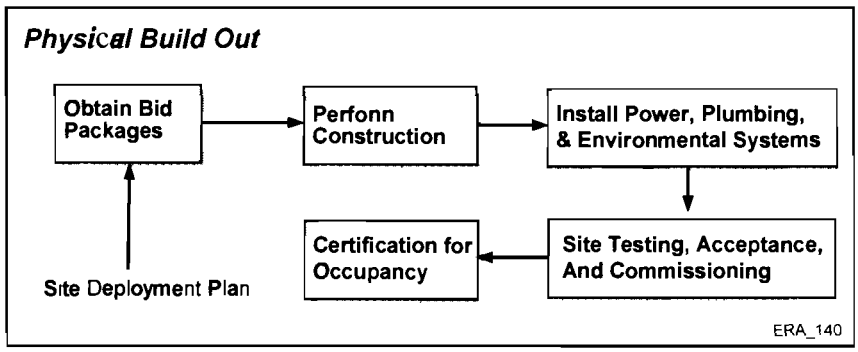


Figure 16–54. Physical Build Out Process

The Physical Build Out process will produce finished and operational facilities ready to accept business tenancy. This process will not likely be invoked during the retrofit of an existing site unless additional floor space is required for the equipment being deployed at the site.

6000 Operations and Maintenance

6100 System Operations Process

The Systems Operations Process, illustrated in Figure 16–55, System Operations Process, is responsible for monitoring the operational systems at an ERA site and keeping them healthy. Primary participants include the Deployment and Operations IPT, the ERA Chief Engineer, ERA Operations Engineers, and ERA Help Desk staff. The process begins with the continuous step of monitoring all hardware, software, networking, power, and environmental system components at the site. Based on behavioral trending information, problems are forecast so that remedial action may be taken before the problem arises of becomes acute. The process is also responsible for executing periodic disaster recovery drills.

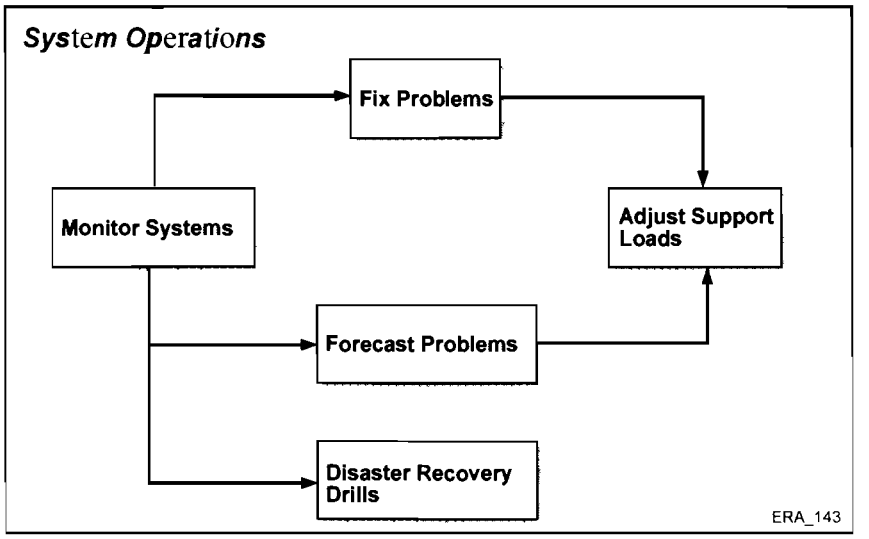


Figure 16–55. System Operations Process

When sudden problems are detected through the monitoring activity, corrective action is immediately initiated so that service levels are restored to normal. Problem information is communicated to the Help Desk process (6200A) so that a trouble ticket can be opened and the issue tracked. Server support loads are adjusted in anticipation of dramatic surges in demand and in response to degraded or failed equipment.

The Equipment Acquisition process is invoked to acquire the additional hardware and software to meet the new capacity requirements. Upon receipt of the equipment, the Installation process is invoked to install, configure, test, approve, and activate the new configuration. The new configuration is entered in the configuration management database.

6200A Help Desk Process

The Help Desk Process, illustrated in Figure 16–56, Help Desk Process, is responsible for dealing with Tier II and Tier III requests. Tier II staff support NARA employees who have questions on system functionality or are having problems accessing needed information. It deals with problems that do not require physically touching a component part and that may be handled remotely/electronically. Tier III support rectifies performance, software, or hardware problems, such as hardware replacements, cold rebooting of a component that cannot be preformed remotely, or anything that involves a configuration change that must be approved through the CCB.

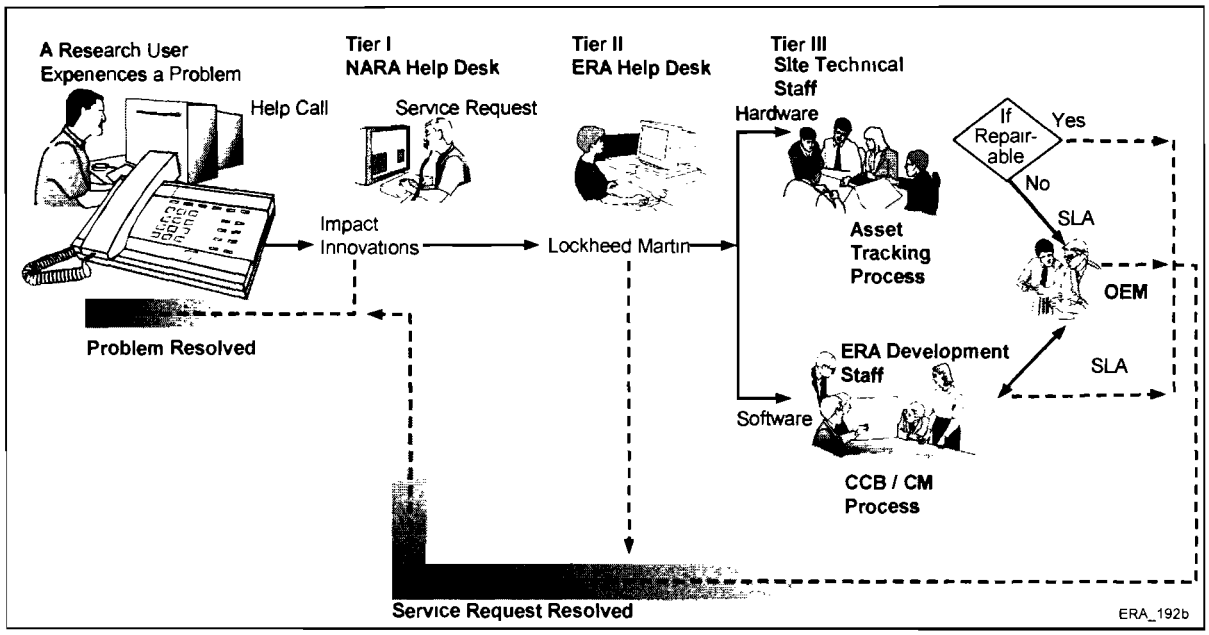


Figure 16–56. Help Desk Process

The Help Desk receives questions and problems via telephone calls and email. A problem ticket is opened if the Help Desk Personnel cannot immediately solve the problem. The Help Desk determines where the ticket should be directed and routes it to hardware or software specialists. The specialists may contact vendor support staff for assistance with the problem. When significant or long-lasting problems arise, the Help Desk notifies NARA and provides an estimated restoration/repair time. When the problem is resolved, the Help Desk closes the ticket.

6200B Item Maintenance Process

When scheduled preventative maintenance is due or when a site item (hardware, software, networking equipment, power system component, environmental system component, etc.) suffers a failure, the Item Maintenance Process is responsible for the repair and/or replacement of the item. Primary participants include the Deployment and Operations IPT, Site Representatives, ERA Engineering staff, ERA Operations staff, and NARA IT Representatives. The process, illustrated in Figure 16–57, Item Maintenance Process, communicates with the change management processes to gain approval for the modification.

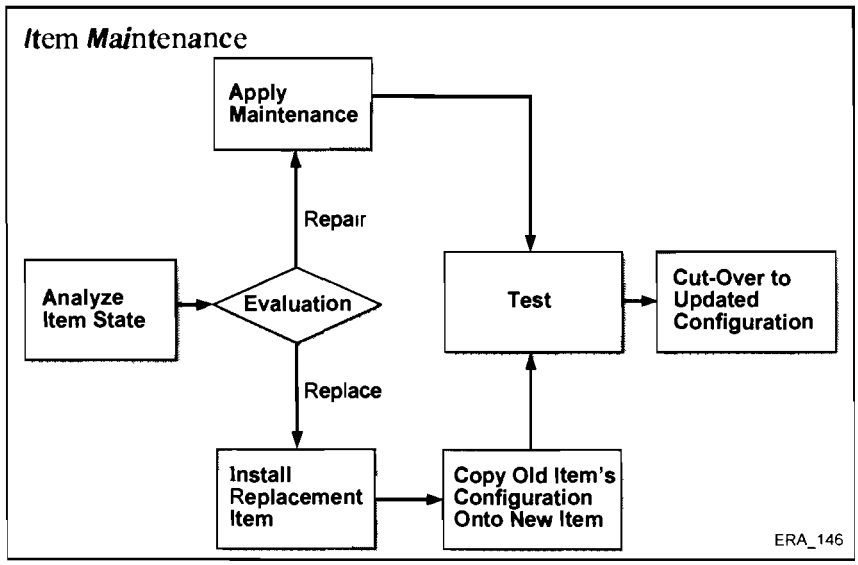


Figure 16–57. Item Maintenance Process

The process begins with an analysis of the item to determine whether it should be repaired or replaced. If the decision is to repair the item, then appropriate maintenance is applied, the item is tested and, if the test is successful, put back into operational use. If the decision is to replace the item, then a replacement is installed while the original item is retained. The original's configuration is copied onto the replacement and the newly configured item is tested to make sure it is functional and works well within the overall ERA configuration. If the test is successful, the new item is left in operational state and the old item is removed and disposed of through appropriate means.

6300 Capacity Enhancement Process

The Capacity Enhancement Process, illustrated in Figure 16–58, Capacity Enhancement Process, assumes that a site is already operational with some pre-determined capacity and that unused space is available for growth.

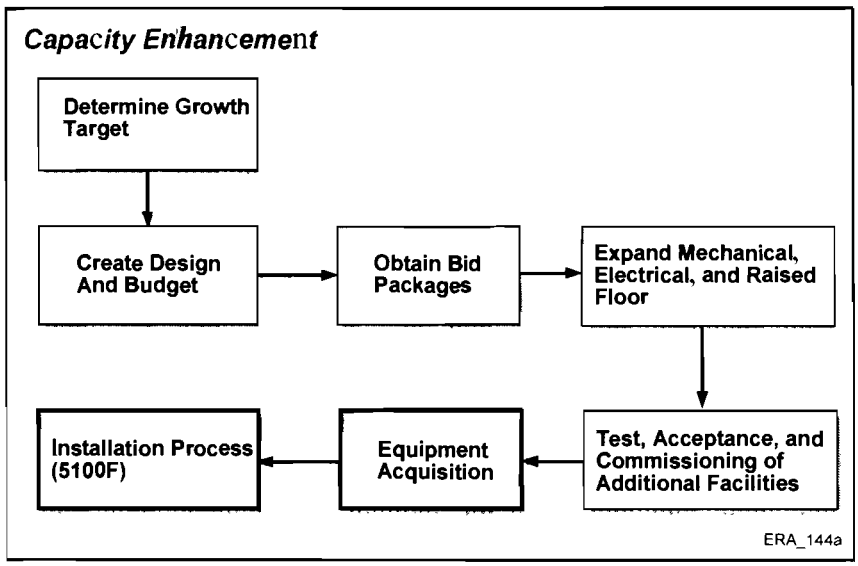


Figure 16–58. Capacity Enhancement Process

Based on changing business needs and capacity management trends, a site's capacity will be periodically enhanced. The Capacity Enhancement Process is responsible for achieving that enhancement. Primary participants include the Deployment and Operations IPT, Site Representatives, ERA Engineering staff, and NARA IT Representatives. When the need for an increased capacity has been determined and a design and budget agreed upon, the process begins by obtaining bids for the new build out activities. Once it has been decided who will perform the work, the build out activhies commence and increased floor space, power, plumbing, and environmental systems are built. Upon successful inspection and testing, the new facilities are commissioned.

6400E Physical Infrastructure Security Process

The Physical Security Process, illustrated in Figure 16–59, Physical Infrastructure Security Process, is the starting point for identifying the physical security requirements for an ERA site. Working in conjunction with NARA and stakeholders, detailed requirements (including devices, tools and staffing) and plans for each site are developed. The process includes checkpoints for assessing progress and status of security operations.

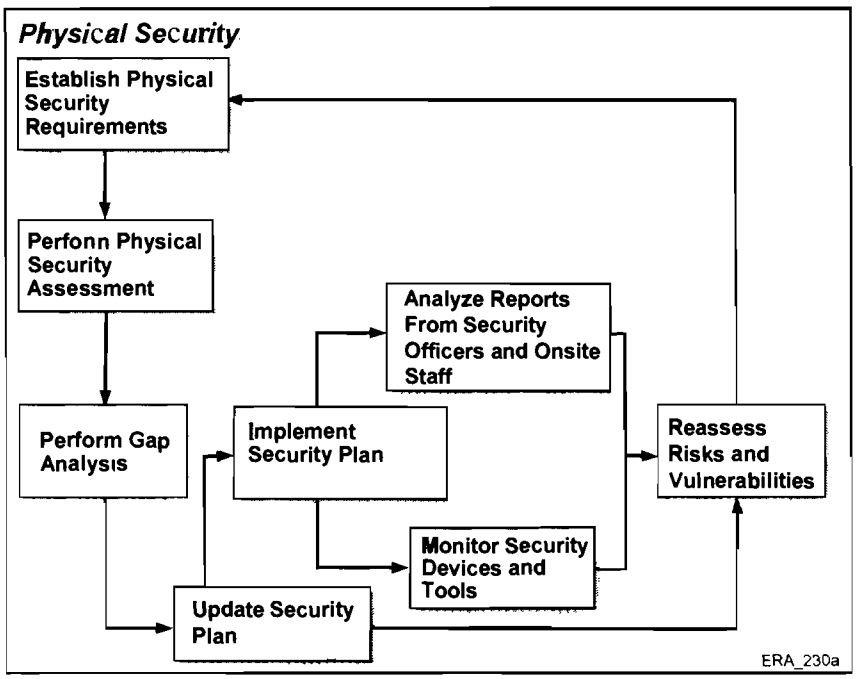


Figure 16–59. Physical Infrastructure Security Process

The process is iterative and the ***5400 Site Assessment Process*** serves as its initiating event. The tirst step is to establish the physical security requirements for the site. The next step, assessment, addresses factors such as the character of the site's neighborhood, local laws and regulations, exposure to natural and human physical threats, the security history of the site, and known structural defects or situations that present an exposure. The physical security assessment provides a baseline for performing a gap analysis. The gap analysis is performed to identify the additions and modifications to existing facilities that are needed to fultill the requirements. Updates to the ERA Security Plan are provided.

The Security Plan is then implemented. Any required hardware, software and equipment is procured and installed. Initially, this occurs as part of the ***5500 Physical Build Out Process*** as a new ERA site is being prepared for occupancy. Security operations commences as the site is being built out, prior to the time it is certified for occupancy. Activity logs generated by the security systems, including the access card readers, biometric devices, and motion detectors are evaluated along with input from security officers and other onsite staff and are mapped to the existing ERA Security Plan. Regular reassessments of the site's security posture are conducted.

Type	CDRL	Process	CLINS	NARA Involvement	IPT/ Group	Program Phase	PE ID	CWBS Element	SA ID	AC ID	T

Type	CDRL	Process	CLINS	NARA Involvement	IPT/ Group	Program Phase	PE ID	CWBS Element	SA ID	AC ID	T
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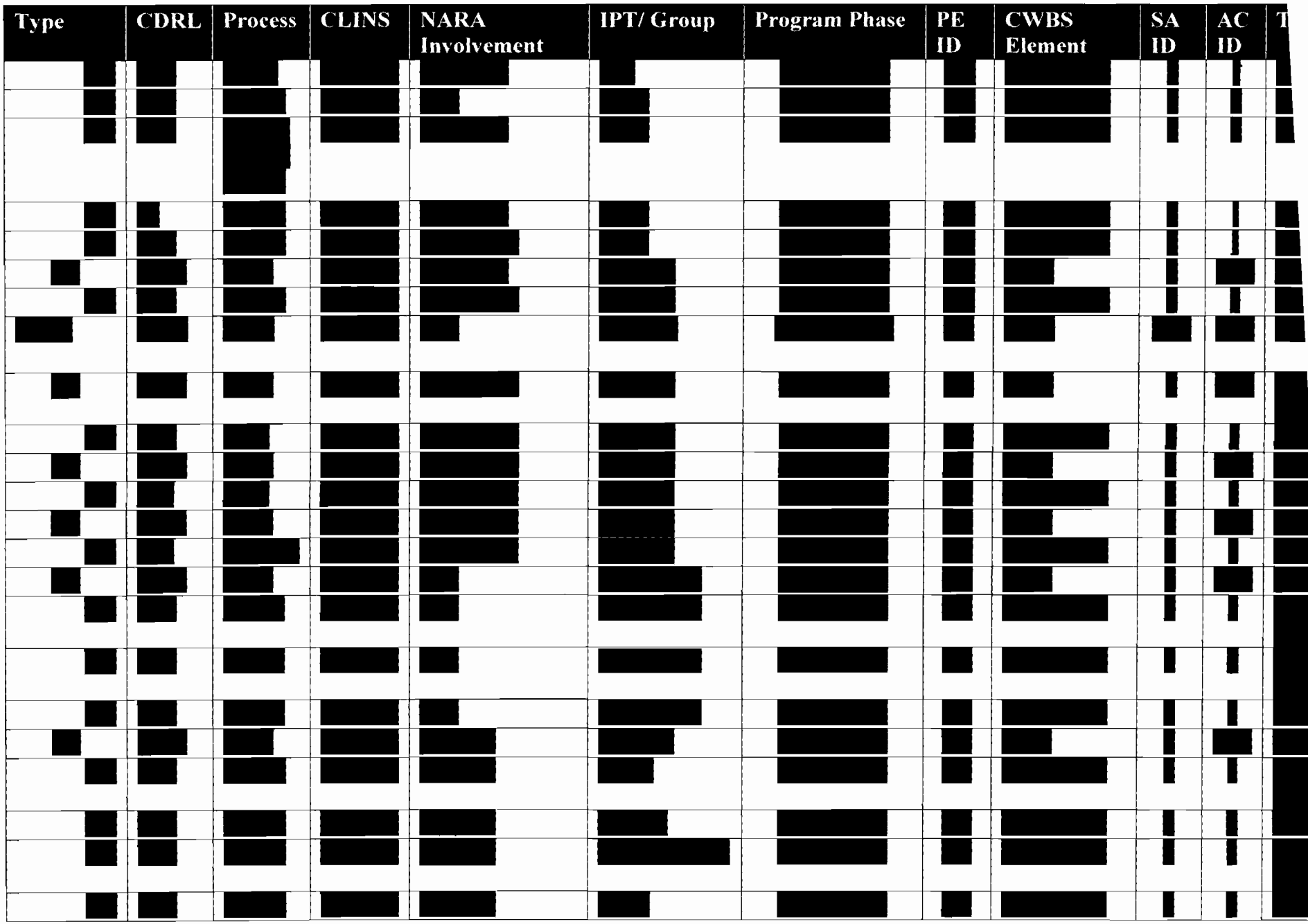
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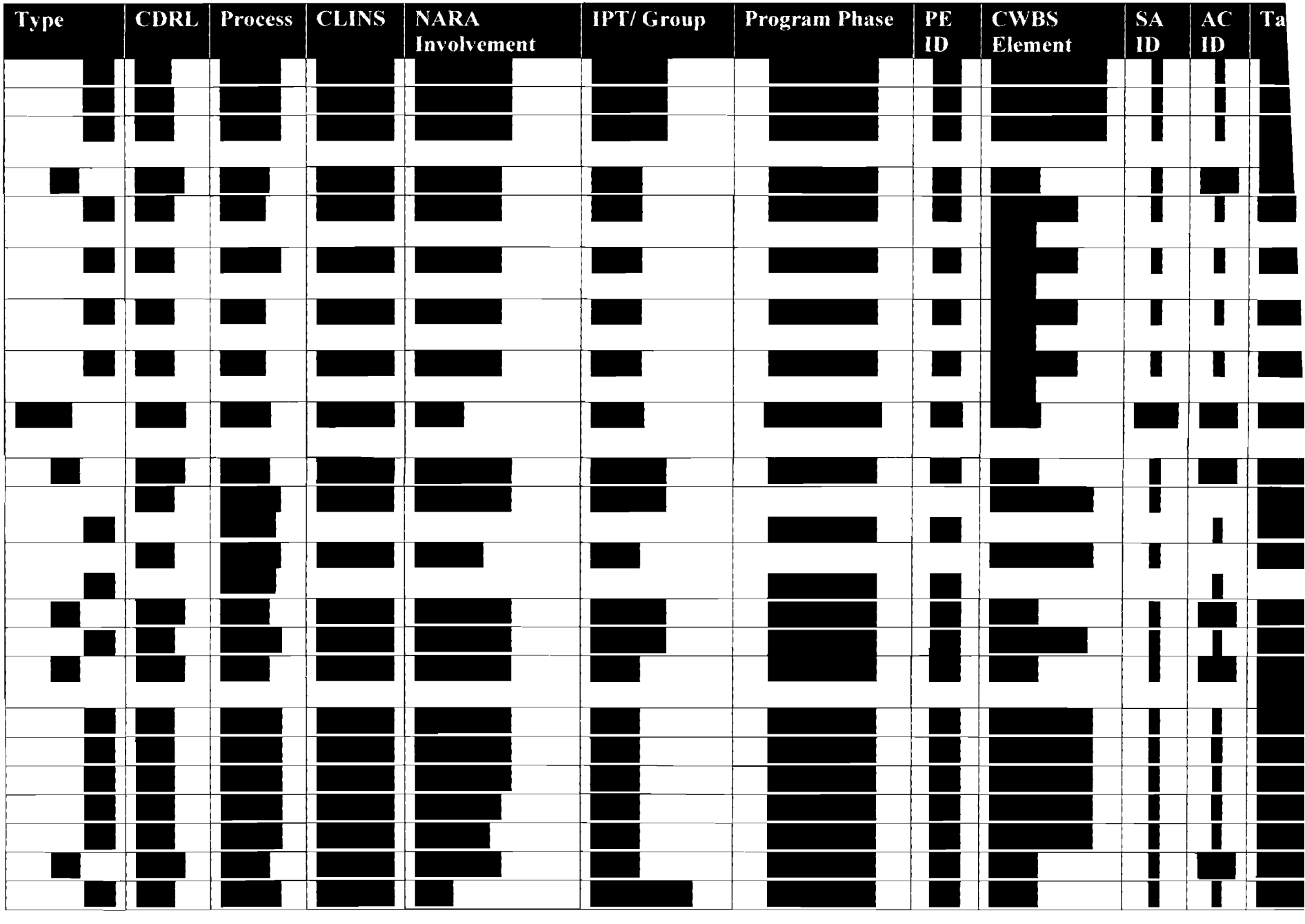
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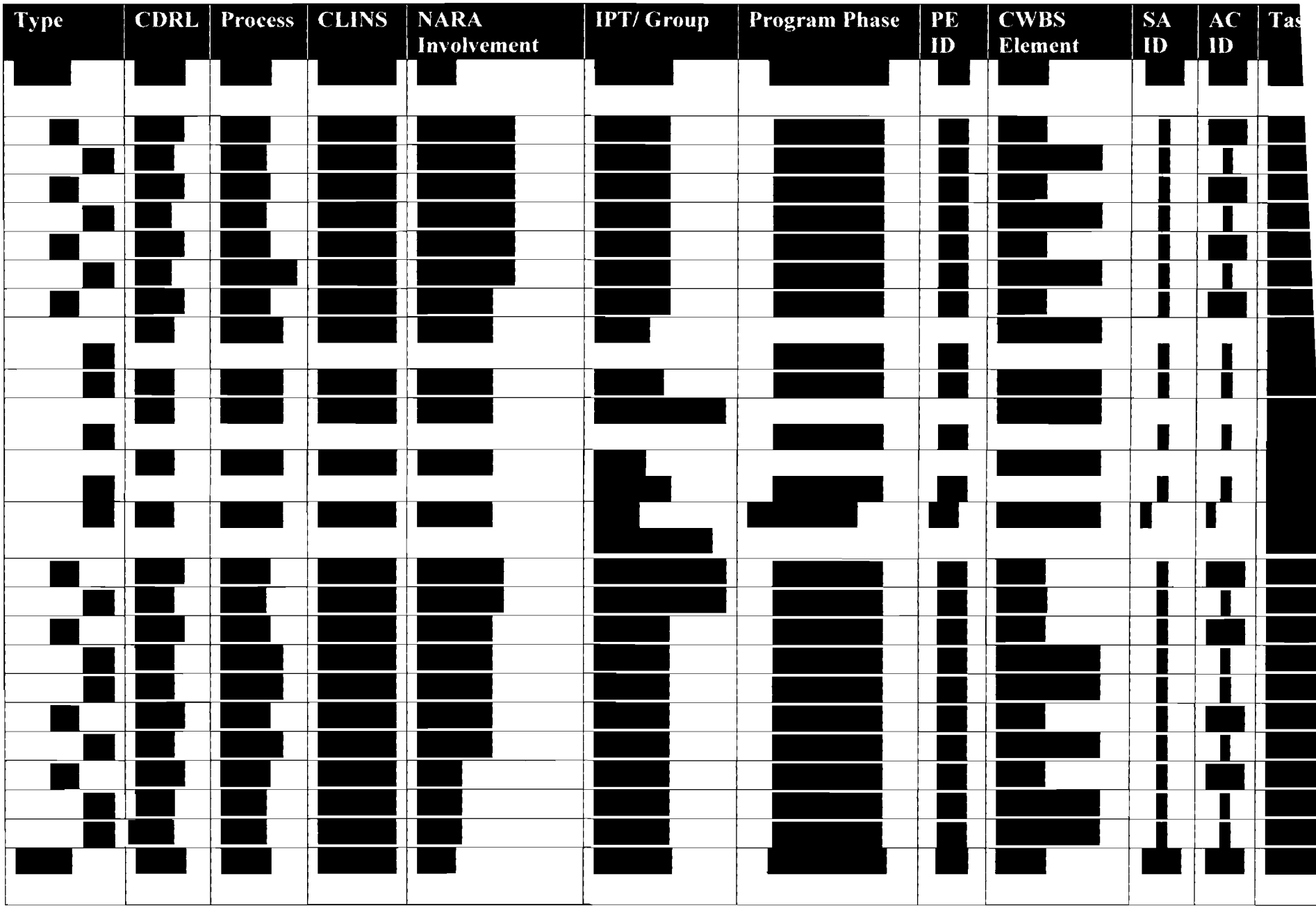
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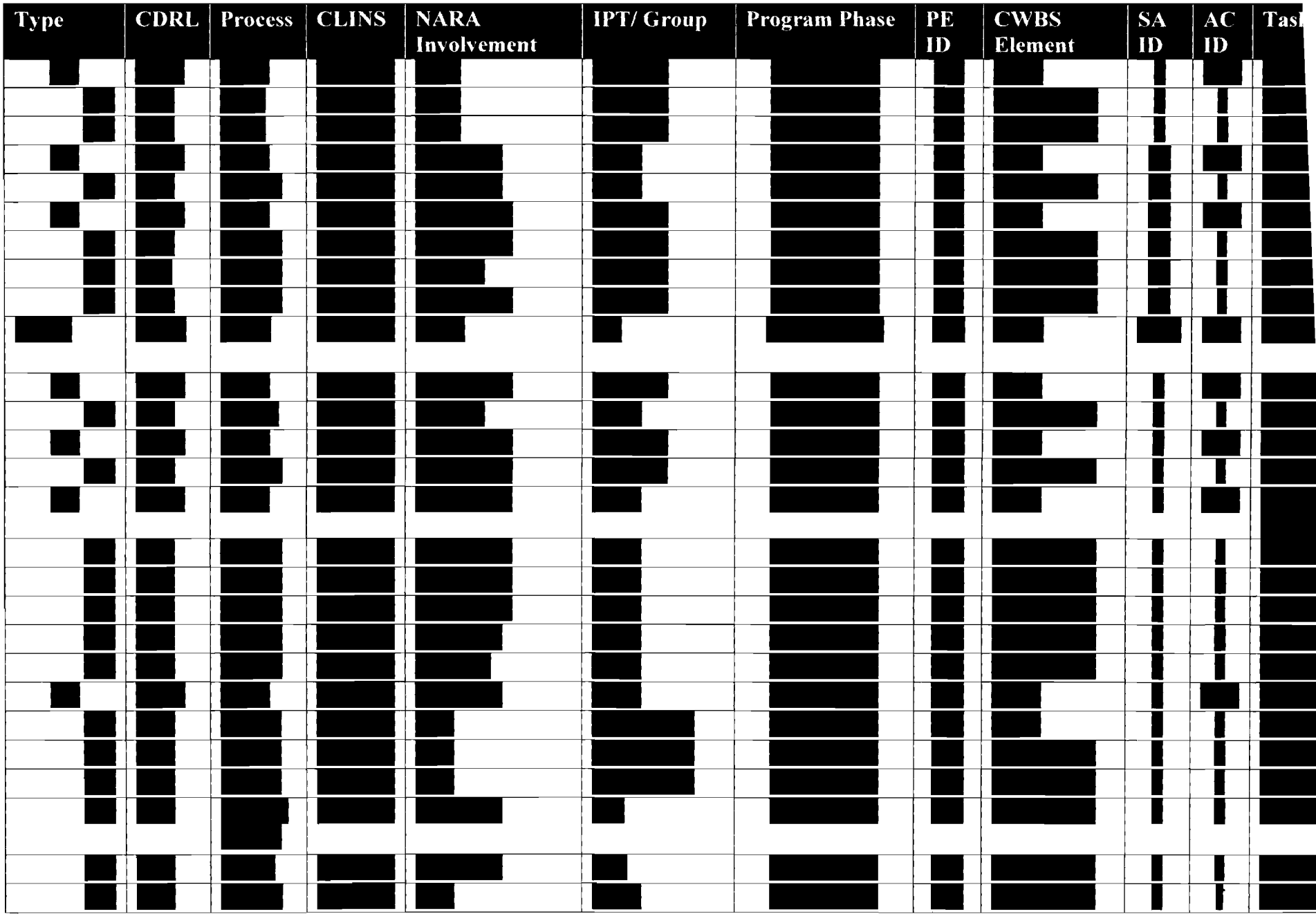
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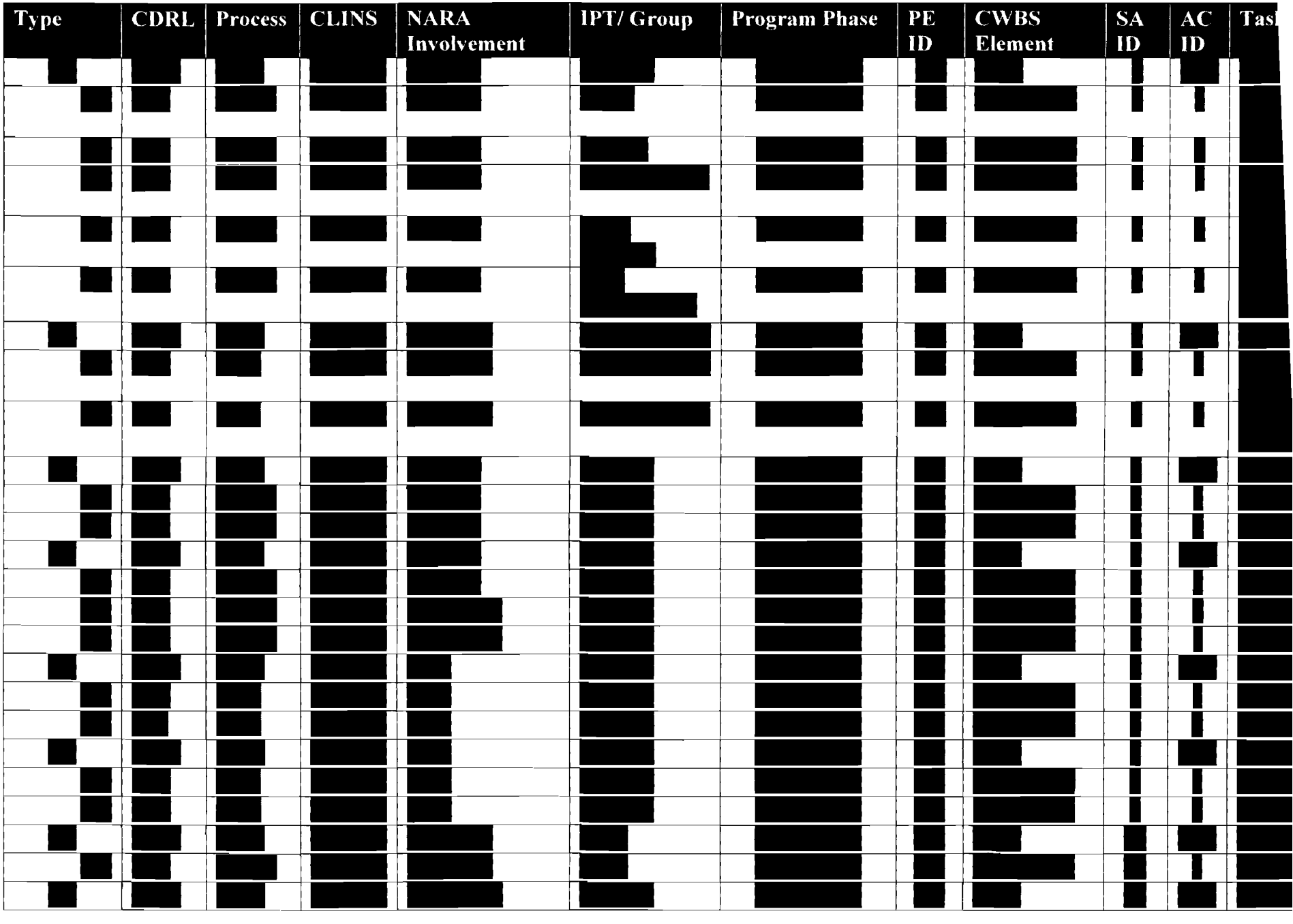
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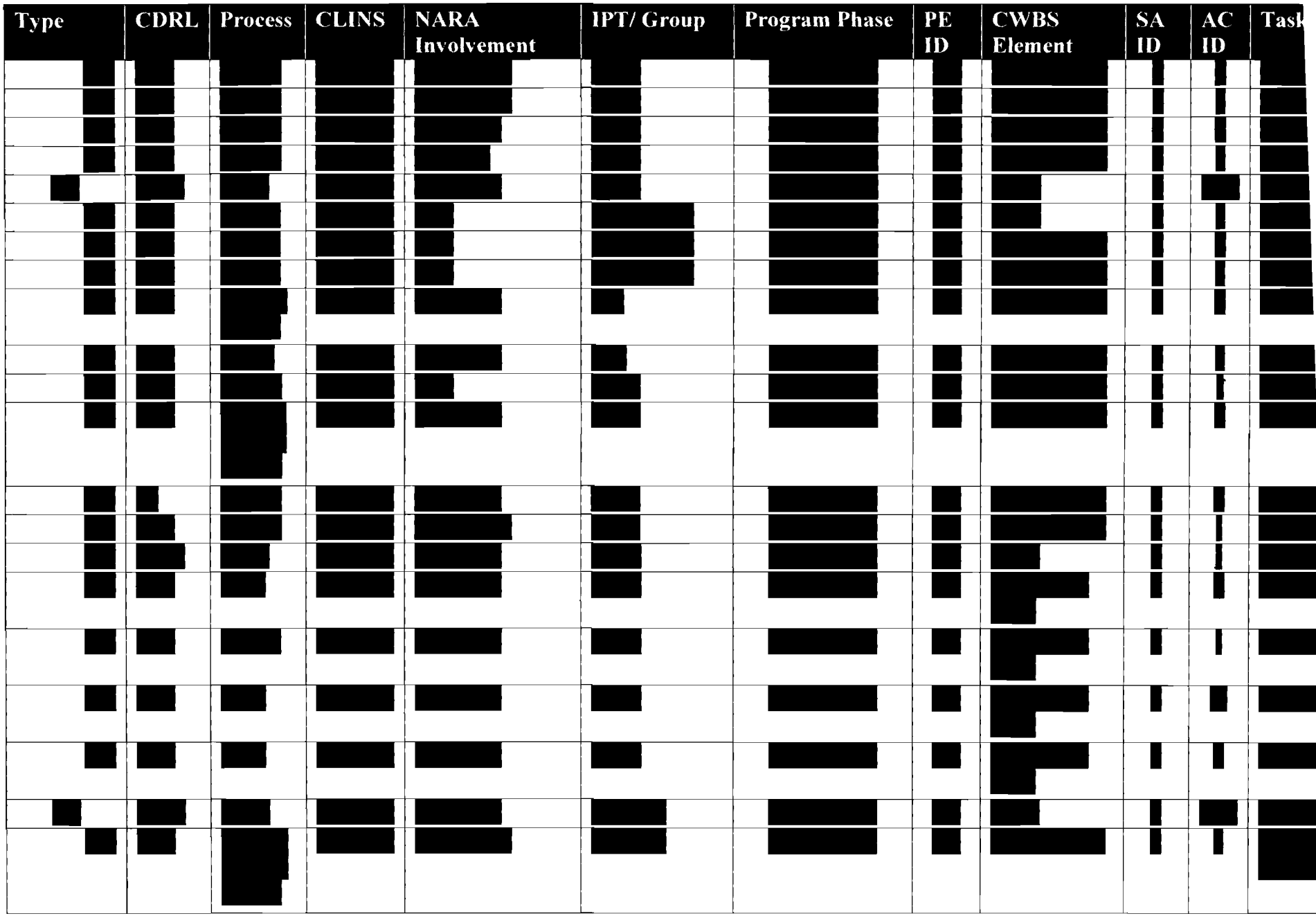
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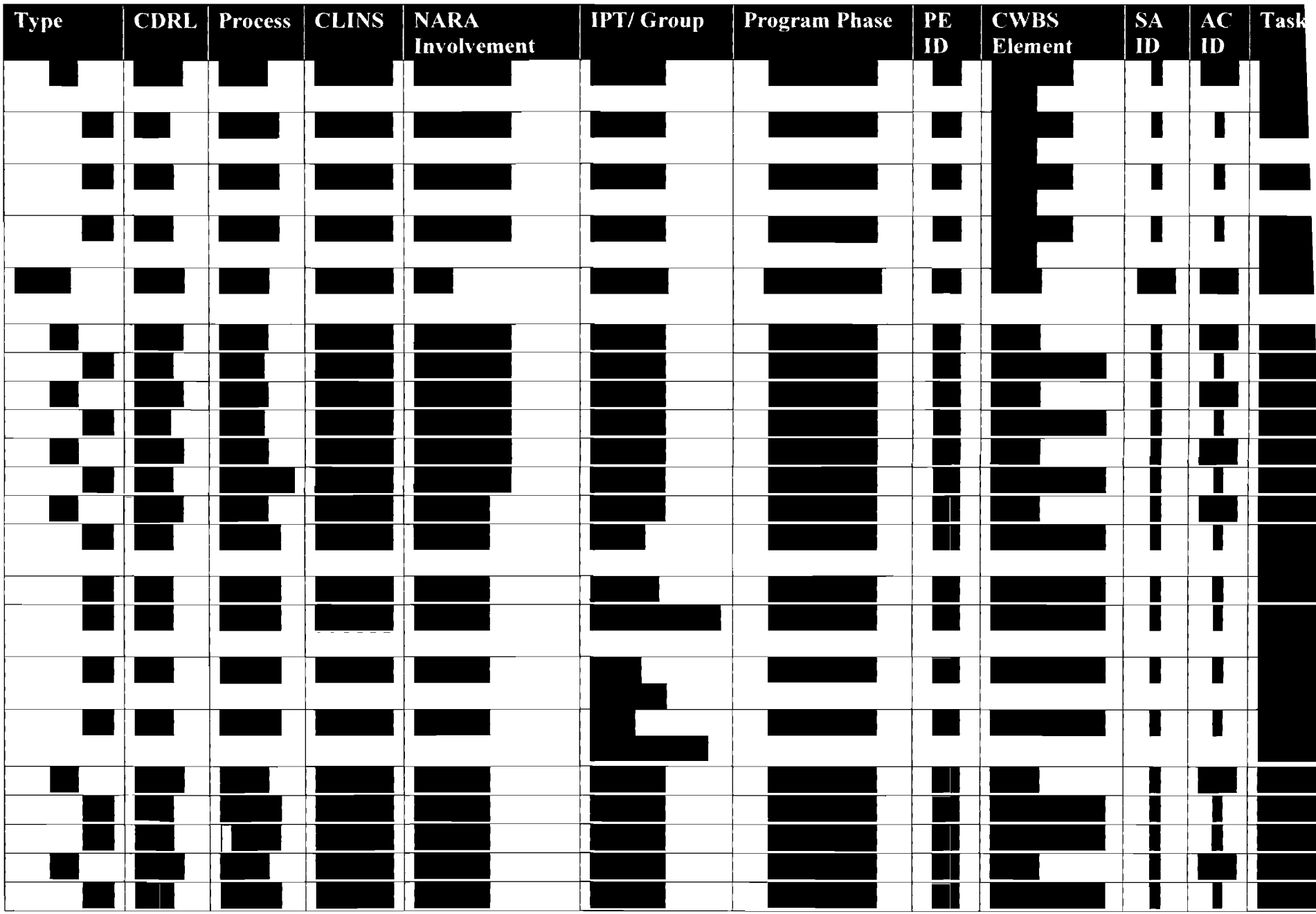
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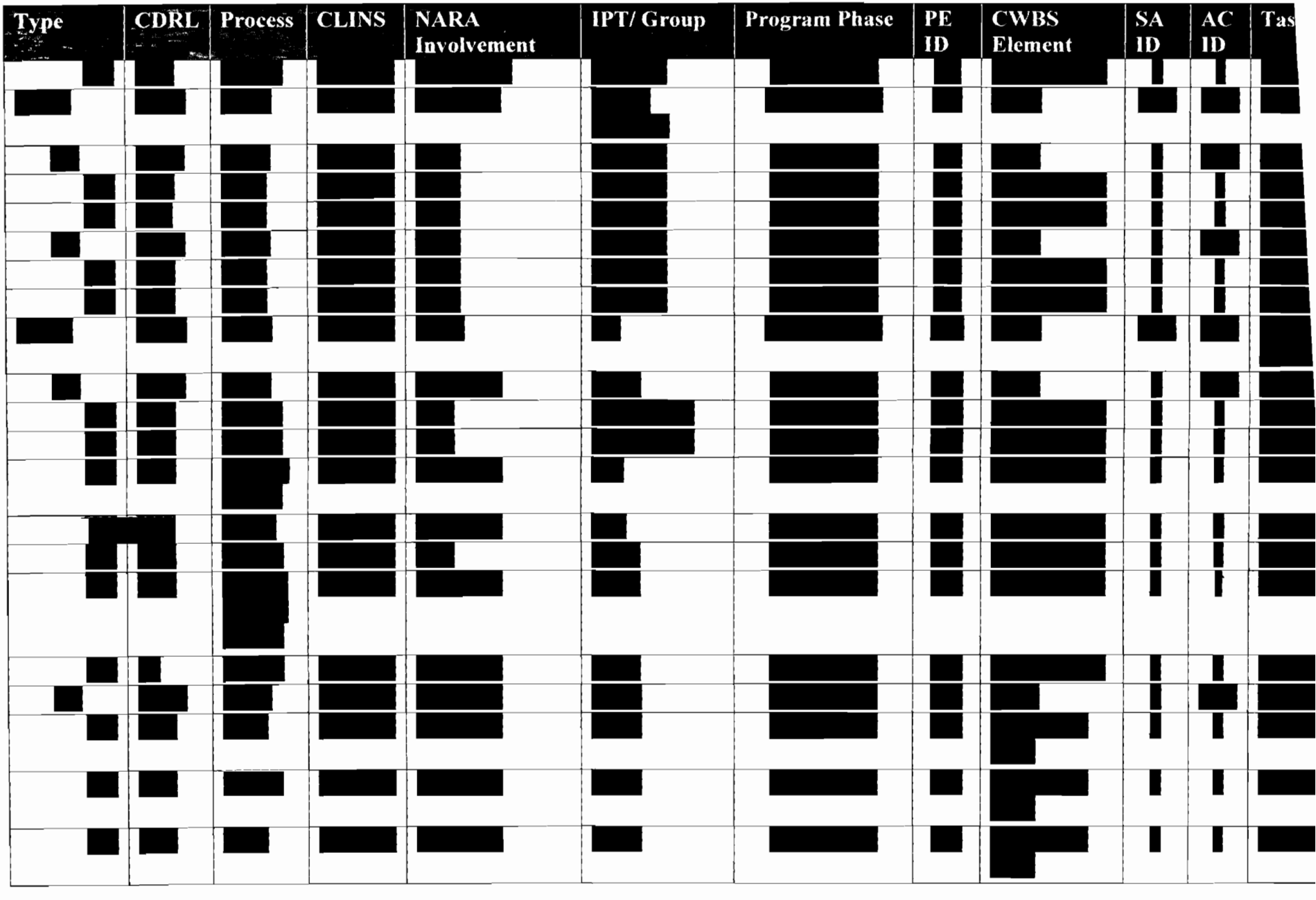
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