625-CD-612-003

EOSDIS Core System Project

ECS Project Training Material
Volume 12: Configuration Management

July 2003

Raytheon Company
Upper Marlboro, Maryland

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ECS Project Training Material
Volume 12: Configuration Management

July 2003

Prepared Under Contract NAS5-60000
CDRL Item 129

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625-CD-612-003

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Preface

This document is a contract deliverable with an approval code of 3. As such, it does not require formal Government approval. This document is delivered for information only, but is subject to approval as meeting contractual requirements.

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Abstract

This is Volume 12 of a series of lessons containing the training material for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS). This lesson provides a detailed description of the different tasks that need to be accomplished in order to: record and manage proposed and approved Configuration Change Requests (CCRs); record, report, manage, and distribute changes to custom ECS software, science software, and database control files; record, report, and maintain system-level changes to the as-built operational baseline; and generate the Configuration Status Accounting Records (CSARs).

***Keywords**:* training, instructional design, course objective, Configuration Management, Configuration Change Request, software changes, Configuration Parameters, Configuration Registry, Configuration Status Accounting, Baseline Manager, Inventory/Logistical Management

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Change Information Page

List of Effective Pages	
Page Number	**Issue**
Title	Revised
iii through xii	Revised
1 through 74	Revised
Slide Presentation 1 through 52	Revised

Document History			
Document Number	**Status/Issue**	**Publication Date**	**CCR Number**
625-CD-612-001	Original	March 2001	
625-CD-612-002	Revised	September 2002	
625-CD-612-003	Revised	July 2003	

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Contents

Preface

Abstract

Introduction

Identification 1

Scope 1

Purpose 1

Status and Schedule 1

Organization 1

Related Documentation

Parent Document 3

Applicable Documents 3

Information Documents 3

Information Documents Referenced 3

Information Documents Not Referenced 3

Configuration Management Overview

Lesson Overview 7

Lesson Objectives 7

Importance 9

M&O Role in ECS CM Activities

Change Management 12
Configuration Problem Management 13
Configuration Change Adjudication 14
Development, Deployment, and Installation of Changes 15
Operations Configuration Baseline Maintenance 15
Science Software CM 16
System Operations Support (SOS) 16
Maintenance of the M&O Libraries 17
Library Administration 17
Baseline Control during Maintenance and Operations 19
Site Authority 20
Configuration Identification 20
Configuration Status Accounting 21
Configuration Audits 23

Configuration Control Boards (CCBs)

Specific CM responsibilities 26
Relationships among CCBs 27
Science Software and Change Control 28

Configuration Change Requests (CCRs)

Change Request Manager 31

Impact Analysis

CCR Impact Summary 37

Software Baselines and Changes

Software Transfer and Installation....42
Software Transfer....44
Installation at Site....44
Configuration Parameters and the Configuration Registry....45
Configuration Registry....45

Hardware Baselines and Changes

Hardware Installation....50

Changes to the Baseline

Management Subfunction and Trouble Ticket System....51
Baseline and Inventory Management: Processes....53
Baseline Terms and Concepts....53
Baseline and Inventory Management: Tools....57
Baseline Manager (BLM) Outputs Useful at the Sites....58
Inventory/Logistical Management (ILM)....63

Practical Exercise

Custom Software Problem....71

Slide Presentation

Slide Presentation Description....73

List of Figures

Figure 1. Change Management....13
Figure 2. Hierarchy of Configuration Control Boards....25
Figure 3. Operational CCB Relationships....27
Figure 4. ECS CCB Form....30

Figure 5. Change Request Manager (DDTS) Main Screen 31
Figure 6. CCR Impact Analysis Form 36
Figure 7. CCR Impact Summary Form 38
Figure 8. Software Transfer Functional Flow 42
Figure 9. Software Installation Functional Flow 43
Figure 10. Configuration Registry Login Window and GUI 46
Figure 11. Configuration Registry Attributes Pop-Up Window 46
Figure 12. CCR Approval Flow 52
Figure 13. ECS Baseline Concept from a Design (CIL/CAL) View 55
Figure 14. ECS Baseline Concept from an Operational (Network) View 56
Figure 15. ECS Baseline Concept from an Operational (Subsystem) View 56
Figure 16. ECS CMDM Server Page 59
Figure 17. ECS Baseline Information System (EBIS) Page 60
Figure 18. EBIS List of Technical Documents 61
Figure 19. Remedy Open window (Note: Not all choices may appear) 63
Figure 20. New ILM-EIN Entry Form 64
Figure 21. ILM-OEM Parts Form 65
Figure 22. ILM-EIN Transaction Form 66

Introduction

Identification

Training Material Volume 12 is part of Contract Data Requirements List (CDRL) Item 129, whose requirements are specified in Data Item Description (DID) 625/OP3 and is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS), Contract (NAS5-60000).

Scope

Training Material Volume 12 describes the processes and procedures for Maintenance and Operations (M&O) Configuration Management (CM) of ECS. This lesson is designed to provide the operations staff with sufficient knowledge and information to satisfy all lesson objectives.

Purpose

The purpose of this Student Guide is to provide a detailed course of instruction that forms the basis for understanding Configuration Management. Lesson objectives are developed and are used to guide the flow of instruction for this lesson. The lesson objectives serve as the basis for verifying that all lesson topics are contained within this Student Guide and slide presentation material.

Status and Schedule

This lesson module provides detailed information about M&O CM training for the current baseline of the system. Revisions are submitted as needed.

Organization

This document is organized as follows:

Introduction:	The Introduction presents the document identification, scope, purpose, and organization.
Related Documentation:	Related Documentation identifies parent, applicable and information documents associated with this document.
Student Guide:	The Student Guide identifies the core elements of this lesson. All Lesson Objectives and associated topics are included.
Slide Presentation:	Slide Presentation is reserved for all slides used by the instructor during the presentation of this lesson.

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Related Documentation

Parent Document

The parent document is the document from which this ECS Training Material's scope and content are derived.

423-41-01	Goddard Space Flight Center, EOSDIS Core System (ECS) Statement of Work

Applicable Documents

The following documents are referenced within this ECS Training Material, or are directly applicable, or contain policies or other directive matters that are binding upon the content of this document:

420-05-03	Goddard Space Flight Center, Earth Observing System (EOS) Performance Assurance Requirements for the EOSDIS Core System (ECS)
423-41-02	Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS)

Information Documents

Information Documents Referenced

The following documents are referenced herein and amplify or clarify the information presented in this document. These documents are not binding on the content of the ECS Training Material.

102-CD-003	Configuration Management Plan for the Science Data Processing Segment of the ECS Project
609-CD-610	Release 6B Operations Tools Manual for the ECS Project
611-CD-610	Mission Operation Procedures for the ECS Project
910-TDA-022	Custom Code Configuration Parameters for ECS

Information Documents Not Referenced

The following documents, although not referenced herein and/or not directly applicable, do amplify or clarify the information presented in this document. These documents are not binding on the content of the ECS Training Material.

305-CD-610	Release 6B Segment/Design Specification for the ECS Project
311-CD-620	Release 6B Data Management Subsystem Database Design and Schema Specifications for the ECS Project

311-CD-621	Release 6B INGEST (INS) Database Design and Schema Specifications for the ECS Project
311-CD-623	Release 6B Planning and Data Processing Subsystem Database Design and Schema Specifications for the ECS Project
311-CD-624	Release 6B Science Data Server Database Design and Schema Specifications for the ECS Project
311-CD-625	Release 6B Storage Management and Data Distribution Subsystem Database Design and Database Schema Specifications for the ECS Project
311-CD-626	Release 6B Subscription Server Database Design and Schema Specifications for the ECS Project
311-CD-627	Release 6B Systems Management Subsystem Database Design and Schema Specifications for the ECS Project
311-CD-628	Release 6B Registry Database Design and Schema Specifications for the ECS Project
311-CD-630	Release 6B PDS Subsystem Database Design and Database Schema Specifications for the ECS Project
311-CD-631	Release 6B NameServer Database Design and Schema Specifications for the ECS Project
313-CD-610	Release 6B ECS Internal Interface Control Document for the ECS Project
334-CD-610	6B Science System Release Plan for the ECS Project
601-CD-001	Maintenance and Operations Management Plan for the ECS Project
603-CD-003	ECS Operational Readiness Plan for Release 2.0
604-CD-001	Operations Concept for the ECS Project: Part 1-- ECS Overview
604-CD-002	Operations Concept for the ECS Project: Part 2B -- ECS Release B
605-CD-002	Release B SDPS/CSMS Operations Scenarios for the ECS Project
607-CD-001	ECS Maintenance and Operations Position Descriptions
152-TP-001	ACRONYMS for the EOSDIS Core System (ECS) Project
152-TP-003	Glossary of Terms for the EOSDIS Core System (ECS) Project
211-TP-007	Transition Plan 6A.04 to 6A.XX (6A.05) for the ECS Project
220-TP-001	Operations Scenarios - ECS Release B.0 Impacts
300-TP-002	Database Descriptions for Synergy III
500-1002	Goddard Space Flight Center, Network and Mission Operations Support (NMOS) Certification Program, 1/90

535-TIP-CPT-001	Goddard Space Flight Center, Mission Operations and Data Systems Directorate (MO&DSD) Technical Information Program Networks Technical Training Facility, Contractor-Provided Training Specification

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Configuration Management Overview

Lesson Overview

This lesson describes the processes established to accomplish Configuration Management (CM) objectives. These processes include preparing Configuration Change Requests (CCRs), Configuration Change Boards (CCBs), implementation of approved hardware and/or software baseline changes, and Configuration Status Accounting (CSA). The lesson also provides practical experience in using the tools needed to perform baseline management and status accounting.

Lesson Objectives

Overall Objective - The overall objective of this lesson is proficiency in the methodology and procedures for CM of the Earth Observing System Data and Information System (EOSDIS) Core System (ECS) during maintenance and operations.

Condition - The student will be given a baseline configuration for ECS, common CM tools, a copy of 609-CD-610 *Release 6B Operations Tools Manual*, a copy of 611-CD-610 *Mission Operation Procedures for the ECS Project*, and a requirement for a change to the baseline.

Standard - The student will use CM tools in accordance with prescribed methods and complete required procedures without error to accomplish all coordination and actions necessary to effect the required change.

Specific Objective 1 - The student will describe the M&O role in ECS CM activities.

Condition - The student will be given a timeline depicting major elements of ECS maintenance and operations.

Standard - The student will correctly identify the overall CM requirement and specific CM objective of M&O, and correctly list or state a specific M&O role in relation to each of the following: 1) the control of changes at operational sites, 2) the maintenance and operation of science software, and 3) the Sustaining Engineering Organization (SEO) CM function.

Specific Objective 2 - The student will list the CCBs involved in ECS CM, identify their inter-relationships, and list their responsibilities and functions in ECS CM.

Condition - The student will be given a copy of 609-CD-610 *Release 6B Operations Tools Manual* and a copy of 611-CD-610 *Mission Operation Procedures for the ECS Project*.

Standard - The student will identify the position of each CCB within the CCB hierarchy without error, and correctly list at least one major responsibility for each, and correctly list three functions of CM Administrators at SMC, EOC, the DAACs, and SCFs.

Specific Objective 3 - The student will execute the procedure to record, report, document, and distribute a change request.

Condition - The student will be given a requirement for a change to the baseline, a copy of 609-CD-610 *Release 6B Operations Tools Manual*, a copy of 611-CD-610 *Mission Operation Procedures for the ECS Project*, and access to DDTS.

Standard - The student will use DDTS correctly to enter data documenting the request, print a report on the request, and identify without error the proper distribution for the report.

Specific Objective 4 - The student will prepare a request for impact analysis.

Condition - The student will be given a copy of 611-CD-610 *Mission Operation Procedures for the ECS Project* and a written description of a science software upgrade configuration change request.

Standard - The student will develop the request for impact analysis, correctly identifying all potentially affected elements of ECS to be analyzed, and use the Change Request Manager software correctly to ensure proper distribution for the impact analysis and impact summary.

Specific Objective 5 - The student will launch the Configuration Registry GUI and view parameters associated with computer software components on ECS hosts.

Condition - The student will be given a copy of 609-CD-610 *Release 6B Operations Tools Manual*, a copy of 611-CD-610 *Mission Operation Procedures for the ECS Project*, and access to the Configuration Registry GUI and database.

Standard - The student will use the Configuration Registry GUI correctly in accordance with appropriate procedures to display the parameters associated with computer software components on a given host.

Specific Objective 6 - The student will execute the procedure to access reports on system baseline information.

Condition - The student will be given a copy of 609-CD-610 *Release 6B Operations Tools Manual*, a copy of 611-CD-610 *Mission Operation Procedures for the ECS Project*, and access to a workstation/terminal on the M & O network from which it is possible to run Netscape.

Standard - The student will correctly use applicable procedures to access baseline reports, including hardware-software maps, a site host map, a list of critical COTS software, a hardware patch map, a COTS software version report, and a COTS software Where-Used report.

Specific Objective 7 - The student will execute the procedure to record, report, document, and distribute a change to the inventory.

Condition - The student will be given a copy of 609-CD-610 *Release 6B Operations Tools Manual*, a copy of 611-CD-610 *Mission Operation Procedures for the ECS Project*, a written description of the inventory change, and access to the Inventory/Logistical Management software.

Standard - The student will use the Inventory/Logistical Management software correctly to enter data documenting the inventory change and print a report documenting the change.

Importance

This lesson provides students who will be CM Administrators at the DAACs , SMC, and SEO with the knowledge and skills needed for effective ECS configuration management. It also provides students who will be System Engineers, System Test Engineers, and Maintenance Engineers at the DAACs with background knowledge and skills for their roles in CM, including implementation and documentation of system-wide changes directed by the Earth Science Data and Information System (ESDIS) CCB and changes directed by a local CCB and/or the Sustaining Engineering Organization (SEO). It ensures management of the capability to:

- control operations across ECS functional segments and operational sites.
- manage successful implementation of large numbers of anticipated system changes.
- interface effectively with interfacing organizations and CCBs.
- communicate changes and baseline definitions to all affected organizations.

It familiarizes students with:

- the importance of early customer involvement in changes.
- the CM tools to be used in all elements of the ECS Project during operations.
- the organization and interactions among hierarchical CCBs.
- the proper use and deployment of CM database assets to support all CCBs.
- the necessary coordination among all elements involved in accomplishing a change in ECS.

It facilitates the achievement of a streamlined CM approach that ensures local organizations operate effectively with the needed autonomy to accomplish their missions, minimizing outside intervention to promote timely resolution of local problems and to enable change during continued timely production of data products.

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M&O Role in ECS CM Activities

The *Configuration Management Plan for the Science Data Processing Segment of the ECS Project*, document 102-CD-003, April 2001, establishes policies, methodologies and procedures, organizations, and change control boards for ECS configuration management. The plan specifies that M&O assumes responsibility for configuration management of new system baselines after a Consent-to-Ship Review (CSR) determines that a system release is ready for transition to sites for installation testing. The site M&O CM activities begin when ECS products are accepted by ESDIS at the host operational sites (i.e., pass Release Readiness Review [RRR] or an otherwise formal transition to operations). In the CM concept:

- ECS operations baselines, or formally approved system configurations, are established at RRR.
- baselines include:
  - COTS hardware and software.
  - custom software.
  - science software.
  - data base schema.
  - related ECS documentation.

Controlling the maintenance and operations changes to ECS products as deployed at the host sites is an ECS Maintenance and Operations (M&O) CM requirement. M&O's specific CM objective is to control the host site's baseline for component changes that may result from:

- new ECS releases with new versions of the system configuration baseline, to be responsive to changed requirements and/or to provide new functionality.
- modification of the ECS operations configuration that provide DAAC-unique functionality; these changes are the responsibility of the DAAC CCB and are not controlled by the ECS CCB unless or until those changes are presented to ECS via CCR and approved by the ECS CCB/M&O CCB for incorporation in the ECS core configuration.
- maintenance actions, which may be "corrective" actions to repair residual flaws or "perfective" actions to improve the effectiveness, maintainability, or performance of the current version of the operations configuration. Perfective maintenance changes or "routine enhancements" are those that:
  - are not a change to a Level 3 requirement (Level 3 requirements are functional and performance contractual requirements specifications. Level 4 requirements are expanded from Level 3 requirements and allocated to subsystems.)
  - are not a change to an external interface.

- are within established ECS M&O budget.
- do not unreasonably conflict with development Releases and implementation of "corrective" maintenance changes.

Operational sites each have a change control function, which is referred to as the site Configuration Control Board (CCB) activity. These sites include:

- Distributed Active Archive Centers (DAACs).
- the EOS Operations Center (EOC).
- the ESDIS System Monitoring and Coordination Center (SMC).

M&O is not a decision-making authority, but assists in implementing site-level and project-wide decisions. The M&O organization provides administrative and technical support to site CCBs to coordinate use of approved CM procedures and to ensure that changes to site hardware, software, and procedures are properly documented and coordinated. Specific responsibilities include:

- Configuration identification: M&O maintains and controls technical documentation related to establishment of unique identifiers for ECS control items.
- Configuration status accounting: recording and reporting information about the configuration status of ECS documentation, hardware, and software throughout the project life cycle; ClearCase reports are used in this baseline management.
- Configuration audits: M&O supports internal and ESDIS assessments of project compliance with relevant CM plans, to ensure that CM policies, procedures, and practices are followed, that approved changes are properly implemented, and that the as-deployed configuration of ECS matches the as-built documentation of configuration items, or that adequate records of differences are available at all times.

Change Management

The ECS M&O organization provides administrative and technical support services for the CCB at each site. Review and approval of maintenance changes are the responsibility of the M&O CCB; the changes are delivered to operations through Pre-Ship Reviews (PSRs).

The management of changes entails several coordinated activities:

- documenting, managing, resolving, and reporting problems with the operational configuration.
- proposing, reviewing, and adjudicating corrective and perfective changes to the operations system configuration.
- developing and deploying the configuration changes to operations.
- maintaining the operational baseline, including approved/shipped and installed change status.

Figure 1 shows the flow, responsibilities, and relationships among change management activities and entities. Major activities or responsibilities are identified by numbers in the figure and addressed with corresponding numbers in the following subsections.

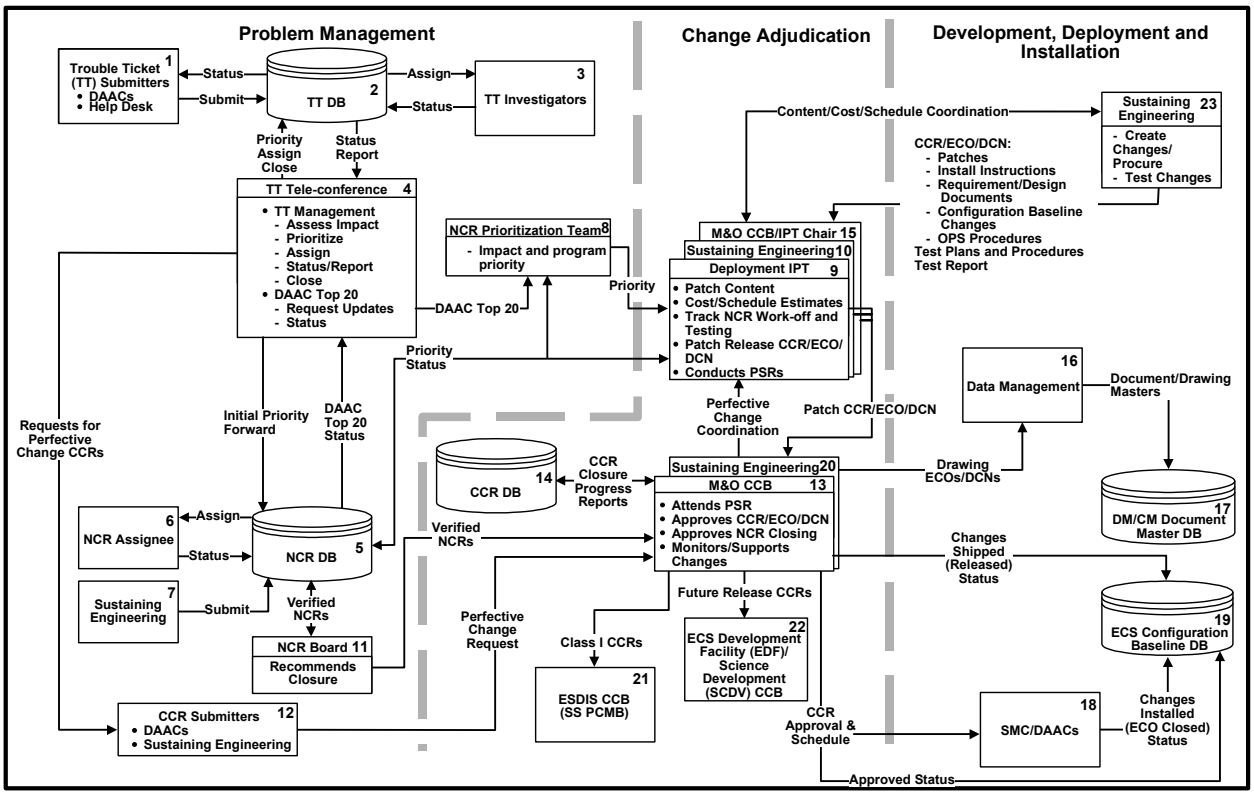


Figure 1. Change Management

Configuration Problem Management

Configuration Problem Management addresses the management of problems, requiring either corrective or perfective maintenance. At a local site (e.g., DAAC), problems are managed as Trouble Tickets (TTs). At the ECS Development Facility (EDF), a TT may be forwarded for management as a Non-Conformance Report (NCR).

- Problems are documented in TTs from submitters [**1**] at the DAACs or Help Desk to an ECS Trouble Ticket database [**2**]. Trouble Ticket Investigators [**3**] at the local site level are assigned to investigate and report the status of the TT.
- A TT Tele-conference [**4**], with members from ECS maintenance and operations, ECS sustaining engineering, the System Monitoring Center (SMC), and the DAACs, reviews the impact, assigns an initial priority, and assigns the problems for investigation by forwarding the tickets to a Non-Conformance Report (NCR) database [**5**]. An NCR assignee [**6**] from ECS sustaining engineering [**7**], which includes personnel in the functions of system engineering, CM, test, and development, is assigned to investigate and report the status of the NCR.

- Problems from the NCR database are then reviewed by an NCR Prioritization Team [**8**], consisting of members from ECS Program Management and ESDIS, for overall program impact. The NCR priority is adjusted as necessary.
- For corrective software changes to the operations configuration, the prioritized changes are tracked by the Deployment Integrated Product Team (IPT) [**9**], consisting of members from ECS maintenance and operations, ECS sustaining engineering [**10**], the SMC, and the DAACs.
- After ECS sustaining engineering test verifies the fix, and before an NCR is closed, the NCR is reviewed by the NCR Board [**11**]. A recommended closure list is forwarded by the NCR Board to the M&O CCB [**13**]. The M&O CCB, which includes members from ECS maintenance and operations, ECS sustaining engineering, the SMC, and the DAACs, approves the closure list.
- If the TT Tele-conference determines that a TT calls for a perfective change, the submitter [**12**] is requested to prepare a perfective change CCR. Proposed perfective software and hardware changes are submitted to the M&O CCB [**13**] in the form of Configuration Change Requests (CCRs) [**14**] for review and adjudication.

Configuration Change Adjudication

Configuration Change Adjudication is the exercise of change control authority and the documentation of the disposition of all changes.

- The Deployment IPT [**9**] includes the M&O CCB chairperson [**15**] and members from ECS maintenance and operations, ECS sustaining engineering, the SMC, and the DAACs. Using the results of the NCR Prioritization Team [**8**], the IPT tracks NCR work-off and testing activity. The IPT also proposes patch contents and schedule to the M&O CCB via CCRs/Engineering Change Orders (ECOs)/Documentation Change Notices (DCNs). CCRs contain the problem description, operations impact, recommended priority, proposed configuration change and/or solution, sites affected, and lists the CIs and affected documentation. ECOs and DCNs consist of the patches, installation instructions, the configuration baseline changes, and the requirements/design/operations procedure documentation.
- The IPT [**9**] conducts PSRs. PSRs review the patch with the receiving SMC and DAACs. PSRs describe the system changes and associated documentation changes including the test results (as found during testing in the EDF facility). The operations procedure changes, configuration baseline changes (including database changes), and installation instructions are also part of a PSR.
- If the patch CCR is approved by the M&O CCB, the actions (ECOs) and documentation DCNs will be assigned to accomplish deployment and installation of the change. Drawing ECOs and documentation DCNs are forwarded to the ECS data management function [**16**] that manages the Document Master database [**17**].

- ECS CM will ship the patch to the System Monitoring Center (SMC) [**18**] for distribution to the DAACs. At this point, baseline changes will be reflected in the ECS Configuration Baseline database [**19**] as shipped/released changes.
- For problems that request perfective changes to the operational baseline, the CCRs are reviewed by the M&O CCB [**13**]. If a perfective change CCR is approved by the M&O CCB, the actions (ECOs) and documentation (DCNs) will be recorded and assigned to accomplish development, deployment and installation of the change. The CCR will then be forwarded to ECS sustaining engineering [**20**] to initiate the change. The M&O CCB will also status and report the progress of the CCR/ECO/DCN closure actions [**14**].
- If any proposed change results in a cost and/or schedule impact exceeding the M&O CCB level of authority, or involves a change to a System Level 3 requirement or external interface, the Class 1 CCR will be forwarded to the ESDIS CCB/Project Configuration Management Board (SS PCMB) [**21**] for adjudication. If the M&O CCB determines that a CCR should be considered for incorporation into a future ECS System Release, the M&O CCB submits the CCR to the ECS Development Facility (EDF)/Science Development (SCDV) CCB [**22**] for adjudication.

Development, Deployment, and Installation of Changes

Development, deployment, and installation of changes are the mechanism by which approved changes are implemented.

- ECS sustaining engineering [**23**] develops or procures (COTS) proposed changes and tests the changes within the current operational baselined configuration at the EDF test facility. In addition to coordinating patch content and schedule as members of the Deployment IPT, ECS sustaining engineering provides the installation instructions, configuration baseline changes, and requirements/design documentation changes.
- Upon approval of a patch CCR by the M&O CCB [**13**], the SMC and DAACs are informed of the approval and schedule through their representatives at the M&O CCB.
- After ECS CM ships the approved patch to the SMC [**18**], the SMC tracks the status of the installations performed by the DAACs. The DAACs' changed configuration baseline and installed status is then updated in the ECS Configuration Baseline database [**19**], and the DAACs notify ECS of the installed status so that the ECO can be closed.

Operations Configuration Baseline Maintenance

The ECS Configuration Management Organization (CMO) supports maintenance of the operations configuration baseline. Its activities include:

- administering the actions of the M&O CCB and the IPT; this activity includes recording, establishing status for, and reporting progress of the CCRs, ECOs, DCNs, and action items.
- maintaining the master copy of the ECS Configuration Baseline database containing the current change status for all CIs including approved/shipped and installed states.
- Performing, and reporting status of, periodic configuration baseline verifications and audits performed in the test environment in the EDF and at the DAACs.

Science Software CM

Each site maintains control over its site operational environment and products developed and/or delivered outside of the ECS project. Science software is one such outside product:

- facilitates the ECS production of Standard Products.
- developed by science investigators at the Science Computing Facilities (SCFs).
- once delivered to the DAAC, it enters the custody of the local DAAC CM organization.
- supported as needed by ECS local personnel.
- Integration and Testing (I&T) conducted by DAAC management in coordination with the local ECS Project's Science Software I&T team.
- after acceptance, revised science software package and all test data are transferred to the control of the local DAAC Manager.
- changes to science software having inter-DAAC dependencies requires coordination with the affected DAACs.
- local DAAC CM organizations ensure that coordination and agreement among ESDIS and affected DAACs is completed before changed science software is moved into production operations

System Operations Support (SOS)

The SOS organization provides a service-oriented organization, standard tools, and processes supplied as CM procedures that can be universally applied to implement ECS on-site CM functions at all operational activities. The SOS performs a range of project-wide CM activities:

- liaison between the ECS Project on-site activities and the ESDIS CCB.

- liaison between ECS Project on-site operations and the Sustaining Engineering Organization (SEO).
- coordination of CM functions to ensure that CM procedures are carried out in accordance with the ESDIS CM Plan.
- coordination with ECS on-site CCBs.
- maintenance of the Change Request Management System.
- support for ECS Project Reviews and audits.
- oversight for dissemination of controlled items to operational sites.
- monitoring installed configurations of developed software and COTS hardware and software for conformance to approved baselines.

The SOS reviews proposed changes to system-wide ECS operations baselines, assesses impacts of the proposed changes, and provides recommendations to the ESDIS CCB on them.

Maintenance of the M&O Libraries

ECS products deployed to the operational sites include software that is common to various operational sites, a golden copy of which is centrally maintained, and software that is site-specific. Both common and site-specific software items, along with related documentation, that have been released for operational use are maintained in the M&O SW Library at each site (On-Site SW Library).

Library Administration

Software documentation and other documentation may be available in hard copy or soft copy. COTS documentation is to be physically located in the library in its own section. Documentation available on CD ROM is to be located in a separate cabinet. Much of the ECS documentation is maintained on line by three ECS functions, the ECS Data Management Organization (DMO), ECS CM, and the System Monitoring and Coordination (SMC) center. These functions require little or no support from the DAACs, with the exception of some SMC functions managed at the Goddard Space Flight Center (GSFC) DAAC.

The DMO is responsible for maintaining ECS data/documentation that includes documents under control of the ECS Change Control Boards (CCBs) and subordinate CCBs. The DMO makes this information electronically available through a web site, the ECS Data Handling System (EDHS), at http://edhs1.gsfc.nasa.gov.

The ECS CM Office requirements and objectives in support of ECS Library Administration are to maintain and publish ECS Technical Baseline Documentation on the ECS Baseline

Information System (EBIS), a web site located at http://cmdm.east.hitc.com/baseline/ or at http://pete.hitc.com. The EBIS contains different types of documents within the ECS Project, such as:

1. Technical Documents, posted as CCRs are approved by CCB.
2. Delivery Reviews, shows detail information on drops and changes.
3. Release Tapes, Shows /us/bincksum data for all files on all major Release Tapes.
4. Version Description Documents (VDDs), Release documents, Build Plans, COTS upgrades, Custom Software.
5. Pre-Ship Reviews, PSR documents – Installation Instructions, VDD drafts.
6. Build Plans.
7. Test Executables.
8. ECS Configuration.
9. Operational Modes.
10. COTS Status.
11. SMC WWWBoard.

The SMC system requirements and objectives in support of ECS Library Administration are overall system performance monitoring, coordinating, and setting system wide polices and priorities. The SMC maintains copies of all deliverables (e.g., binaries, executables, Toolkit deliveries, test data, NCR workarounds, README files, general instructions). The SMC servers are the distribution points for the following functions:

1. Staging area and distribution for ECS Custom/COTS Software deliveries.
2. Distribution to the sites of non-contractual documentation (e.g., README files, COTS electronic instructions, Technical white papers, CCRs, NCR Workaround instructions, database scripts).

Information can be retrieved electronically from the SMC by accessing the web site at http://m0mss01.ecs.nasa.gov/smc/.

At the ECS Development Facility (EDF), the CM Office manages a Microsoft Access database to control and maintain COTS documentation and software residing in the library. The database enables CM personnel to locate and retrieve document information. The database also permits COTS documentation requests to be submitted to the COTS software librarian.

Site personnel maintain partitioned libraries to facilitate access control of science software and other software not developed by ECS (e.g., DAAC-Unique Extensions). Site personnel are responsible for any CM activities concerned with this library. Specifically, certain ECS documents are under CM control as part of the baseline (e.g., 609-CD-610, *Release 6B Operations Tools Manual*). The COTS software librarian at the EDF uses the Baseline Manager Tool to record the change history and updates to those documents, as well as to provide the

master index for the library. Use of the Baseline Manager Tool is addressed in a different context under a later topic in this lesson.

Baseline Control during Maintenance and Operations

ECS is characterized by a phased implementation and delivery using multiple releases. From an M&O CM perspective, each major release has the following major milestones:

- acceptance of each host site's Installation Plan (IP); documents the COTS hardware, the hardware's configuration, and the installation schedule for each site.
- a Consent to Ship Review (CSR); documents the state of the configuration items including the development configuration at the ECS Development Facility (EDF), the actual configuration of each host site's hardware, and the planned configuration of each host site's software. The CSR has been used in the initial phases of ECS development for major releases, to determine the readiness of the release to transition to sites for installation testing. In later phases of the program, the function is served by a Pre-Ship Review (PSR), which determines readiness of a configuration change (e.g., a patch or larger change) for delivery.
- a Release Readiness Review (RRR); documents the state of the configuration items including the actual configurations at each of the host sites.
- an Operational Readiness Review (ORR); documents the flight-certified and ESDIS-approved fully integrated EOS Ground System (EGS).

Prior to RRR, the development CM controls the baseline. Development organizations follow the practices and procedures of the configuration control process at the host site for installation of hardware into the facility and use of hardware (including operational test strings).

At RRR M&O CM impounds the configuration including:

- COTS hardware.
- COTS software and control files.
- Custom software binaries.
- Custom software database schema and/or contents.
- Build and installation procedures, job control decks, test, training and operational material, and related documentation; subsequent configuration changes are controlled by the appropriate engineering or operations organization at each site.

Site Authority

At RRR, the ECS On-Site Organization interfaces with the local site CCB and provides engineering recommendations for requested changes to common software. Change control authority depends on the type of change in question:

- ESDIS - authority over changes to common software for system-wide implementation.
- site CCB - authority over site-specific Class II changes (those not requiring contractual change for implementation).
  - site-specific parameters for COTS software installed at operational sites.
  - specific configuration of tools and utilities installed at local site, as delegated by ESDIS.

Configuration Identification

Configuration identification establishes unique identifiers for ECS control items to allow for the establishment and maintenance of control and status accounting for the items:

- Hardware.
- Software.
- Databases.
- Documentation.

Configuration identification originates from the ECS Development Configuration Items List (CIL), as delineated in the ECS System Baseline Specification. The specification also:

- Defines the configuration baseline data structure and data schema.
- Delineates how the items will be named, described, versioned, and controlled.
- Defines the item's associated engineering specifications and location of the actual controlled baseline data (including the ECS Configuration Baseline database).

The ECS Configuration Baseline may be changed by introduction of a new baseline associated with a new System Release at a Consent-to-Ship Review (CSR) or through changes accompanying system patches at Pre-Ship Reviews (PSRs).

For configuration control, use the following procedure.

Configuration Control

1 The Change Control Boards (CCBs) chartered by the ESDIS CCB shall apply configuration control measures to all the ECS CIs and the associated documentation prior to the time they are baselined for operations.

2 Provide a formal and effective means for proposing engineering changes to CIs.

3 Provide a formal and effective means for requesting deviations and waivers.

4 Provide formal notices of revisions.

5 Provide Specification Change Notices and Document Change Notices.

6 Ensure the implementation of approved changes.

Configuration Status Accounting

Configuration Status Accounting produces reports or metrics and maintains records to support configuration management. These reports/metrics and records provide status tracking information to assist in the management of changes, supporting activities such as the following (with the indicated data):

- identification and resolution of configuration problems (e.g. Trouble Ticket and NCR listings and progress reports).
- M&O CCB review and approval of changes to the operations baselines (e.g. CCR listings and progress reports, CCB agendas and minutes).
- monitoring progress for releasing and development of configuration changes (e.g. ECO status reports, DCN status reports, IPT Drop Matrix listings).
- maintenance of ECS Configuration Baseline status (e.g. Approved/Shipped Changes, Installed Changes).
- verification and auditing of the operations configuration baselines (e.g. discrepancy metrics/reports reflecting differences between the approved and installed baselines in both the testing environment in the Verification and Acceptance Test Center [VATC] and at the DAACs).

For configuration status accounting, use the following procedure.

Configuration Status Accounting

1 Issue a Change Request Manager report on new CCRs and revisions monthly.

- Provide an annual summary of CCRs and revisions.

2 Ensure CCB review of all CCRs.

- Distribute CCR copies (and Impact Analysis forms if applicable) for review prior to the CCB meeting.
- Print and distribute a formal agenda prior to the CCB meeting.

3 Status open action items regularly between CCB meetings.

4 Conduct CCB meetings and formally record the CCB's disposition of each CCR.

- Record actions, assignments, and due dates.
- Distribute minutes to the standard distribution and inform those assigned responsibility of assigned action items.

5 Maintain document changes through the SEO Librarian.

- When all authorized document changes have been accomplished, prepare a Document Change Notice (DCN).
- Post the final version.
- Distribute hard copy as required.

6 Monitor CCR Implementation Status.

- After CCB disposition, regularly status open CCRs until closure.
- Class I events include: CCR to Project Control Management Board for review approval; Technical Review Board; and ESDIS Disposition.
- For M&O implementation, further events include: Consent Obtained; Item Received; Installed; Document Completed.
- A Class I CCR is not closed until the ESDIS contract officer's authorization is received or the reference CCR has been withdrawn.
- Class II document change CCRs may be closed with the CM Administrator's issuance of the DCN.
- Other non-document change CCRs may be closed when the originator verifies to the CM Administrator that all specified changes have been implemented.

Configuration Audits

Configuration audits are conducted by the ECS CMO, with the participation of the M&O CCB and the Deployment IPT, and with the support of the site CM function. These audits are of two types:

- Functional Configuration Audits (FCA).
- Physical Configuration Audit (PCA).

These audits validate that:

- the as built configuration compares with the approved baseline.
- test results verify that each ECS product meets its specified performance requirements to the extent determinable by testing.
- the as-built configuration being shipped compares with the final configuration tested in the VATC.

Any differences between the audited configuration and the final tested configuration are documented. After DAAC installation, automated scripts will be used to compare DAAC configurations to baseline documentation, with corrections as necessary either to the baseline documentation or to the DAAC configuration.

For configuration audits, use the following procedure.

Configuration Audits

1 Review the set of issues addressed in the process for which the audit is to be taken.

- Audits are standardized within the set of issues addressed.
  - Functional Configuration Audit/Physical Configuration Audit (FCA/PCA).
  - Security Issues.
  - General Accounting.
  - Test Readiness Review.
  - Operational Certification.

2 Prepare an audit plan specifying the detailed assessments to be conducted.

- Identify the tests, inspections, reviews, or other verifications required.

3 Prepare an agenda for any conferences to be held.

- Identify the planned location, date, attendees, time schedule, and topics addressed.

4 Schedule resources necessary to conduct meetings and to collect and analyze the data.

- Ensure availability of all necessary technical documentation (e.g., applicable specifications, drawings, manuals, schedules, design data, test data).
- Ensure availability of all tools and inspection equipment necessary for evaluation and verification.
- Ensure unencumbered access to the areas and facilities of incoming inspection, fabrication, production, and testing.
- Ensure any necessary isolation of the item(s) and detailed parts to be reviewed.

5 Collect data.

- Conduct the planned tests, inspections, reviews, or other verifications.

6 Analyze data to produce interpretable test results.

- Conduct any necessary statistical tabulations, summaries, and analyses.

7 Prepare meeting minutes, including resulting audit action items.

- Attach relevant documentation (e.g., copies of inspection reports, process sheets, data sheets, and other documentation deemed necessary by Government FCA/PCA teams.

Configuration Control Boards (CCBs)

There are multiple levels of configuration management within the ECS Project. The project Configuration Control Board (CCB) procedures exist in the context of procedures reflected in the *Earth Observing System (EOS) Configuration Management Plan*, 420-02-02. That plan identifies the organization, authority, and responsibilities of CCBs for NASA Headquarters, the Earth Science Enterprise (ESE) Office, Projects within the ESE/EOS organization at GSFC, and contractors and Principal Investigators. Contractor CCB procedures, including those for ECS, are subject to the approval of their respective ESE/EOS Project Office. For the ECS program, that office is the Earth Science Data and Information System (ESDIS).

Figure 2 illustrates four levels of a CCB hierarchy for the ECS program relative to that office.

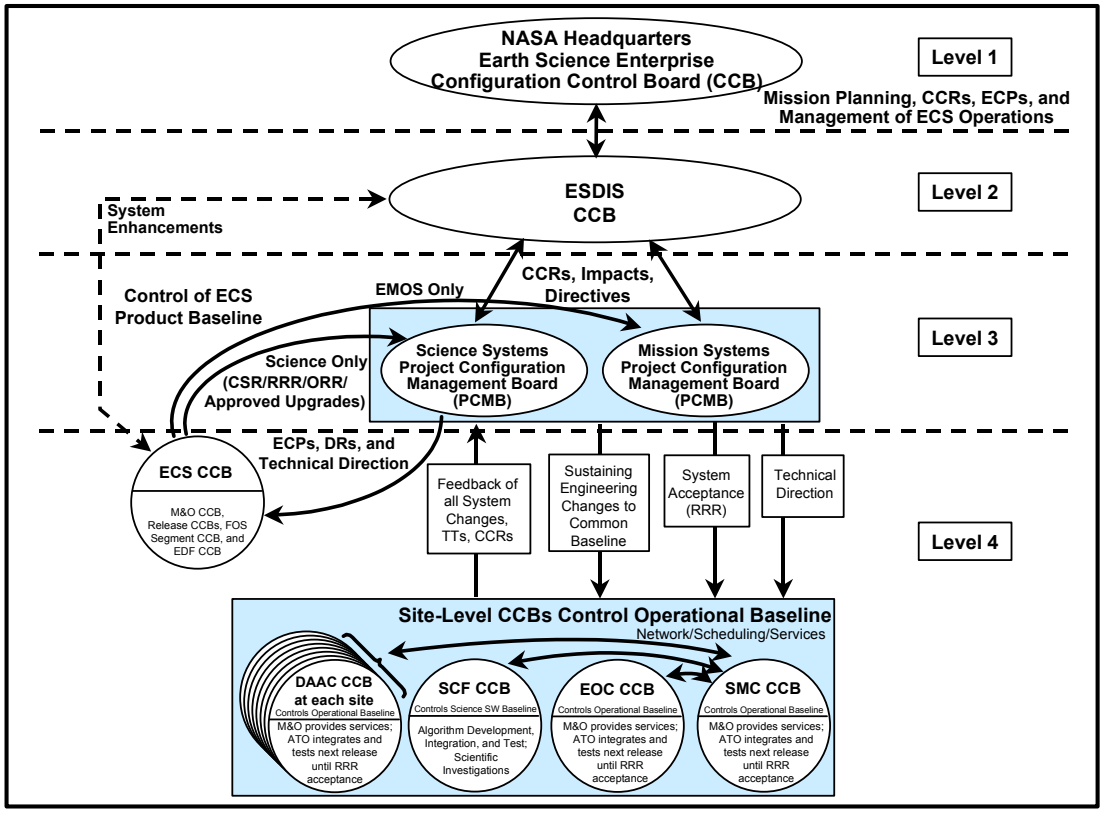


Figure 2. Hierarchy of Configuration Control Boards

- NASA management layers.
  - Two NASA management layers at Headquarters (level 1) and Goddard Space Flight Center's Earth Science Data and Information System (ESDIS)(level 2) control the overall ECS mission and contract, respectively. The level 2 Change Control Board (CCB) controls the ECS implementation, maintenance, and operations at the various field sites.

  - At level 2, ESDIS establishes ECS CM policies and, through contract, controls ECS implementation, maintenance, and operations at the various field sites. There are also four project CCBs (AM Project, PM Project, Chemistry and Special Flights Project, and Landsat 7 Project), as well as the Earth Science Enterprise Management Control Board (MCB), which reviews Class I project change requests prior to their submission to the NASA HQ PCB.

- Project Control Management Board (level 3): The Missions System Board (PCMB) manages and controls the requirements for the ECS Flight Operation Segment (FOS), EOS Polar Ground Stations, EDOS, NISN, and ETS. The Science Systems Board (PCMB) oversees the Science and Communications Development Office at the ECS contractor, the SMC, and the individual DAAC boards.
- ECS Project CCB (level 4): At this level, the performing organization (ECS Development) controls ECS development activities through the RRR.
- On-site CCBs (level 4): control the operational ECS; each DAAC board and the SMC are responsible for maintaining the site physical baseline.
  - run by host organizations.
  - supported by ECS M&O.

Specific CM responsibilities Specific CM responsibilities pertain to each level:ESDIS Management -- establishes ECS CM policies.

- CCBs -- classify, prioritize, evaluate, recommend, and approve (within their authority) changes to the ECS operations baselines.
- CM administrators (at SMC, EOC, DAACs, and SCFs) --
  - establish and maintain CM records, including hardware lists, drawings, and documents.
  - facilitate the configuration change request (CCR) process.
  - monitor and report status of proposed and approved CM actions.
  - support their respective CCB (as required).
- Sustaining Engineering Organization (SEO) --
  - assesses feasibility and cost, schedule and performance impacts of proposed system-wide changes.
  - implements such changes when directed by ESDIS.

- DAAC System Engineers/System Test Engineers --
  - assess DAAC impacts of system-wide proposed changes.
  - develop and maintain ESDIS-approved DAAC-specific modifications to ECS products.
- Maintenance Coordinators --
  - maintain ECS HW and report configuration changes resulting from maintenance actions.

Relationships among CCBs

Figure 3 illustrates some of the relationships and activities in which CCBs are involved.

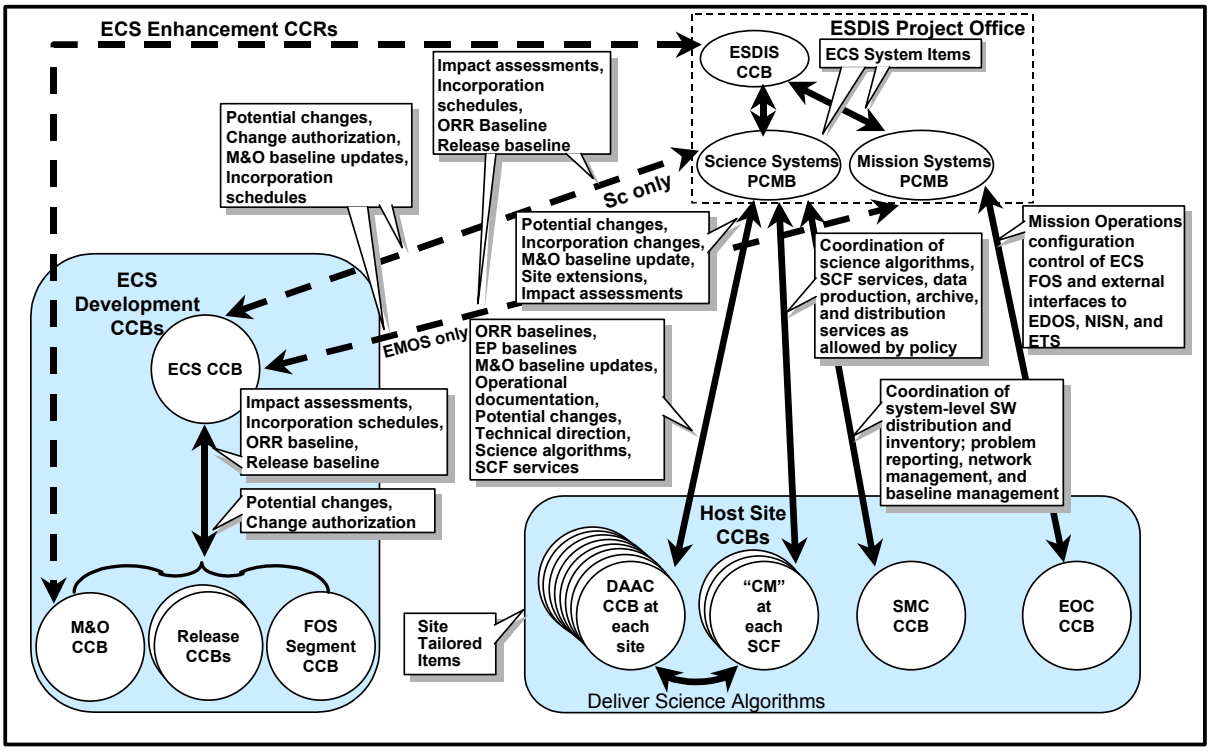


Figure 3. Operational CCB Relationships

There are several areas of coordination and control involved in ECS configuration management:

- CCBs at operations centers and the ECS CCB interact directly with the ESDIS CCB.
- ECS sub-tier development CCBs manage installation and changes at each location prior to RRR under the governance of the ECS CCB and, as necessary, the ESDIS and host center CCBs.
- the ECS M&O organization at each center does not constitute a CCB but, rather, supports the host organization's CCB.

- the ESDIS CCB provides configuration control over all ECS developed CIs, in accordance with the ESDIS Distributed Active Archive Center (DAAC) Strategic/ Management Plan.

Science Software and Change Control

Each Science Computing Facility (SCF) performs its own configuration control, without an active support role by the ECS contractor. Specifically, the SCF provides two types of configuration control:

- Configuration control of software and databases that are to be executed in another site's environment.
- Configuration control of SCF resources that are made available to the EOSDIS community.

The ECS M&O CM function at each DAAC accepts science software and data items from the SCF. These items are incorporated into the DAAC's operational baseline as directed by the DAAC CCB.

The EOC controls the operational configuration of the required EOC operational baseline. The ECS M&O CM function provides services as directed.

The Project Control Management Board is charged with the responsibility for centralized coordination and control of ECS CM activities to ensure:

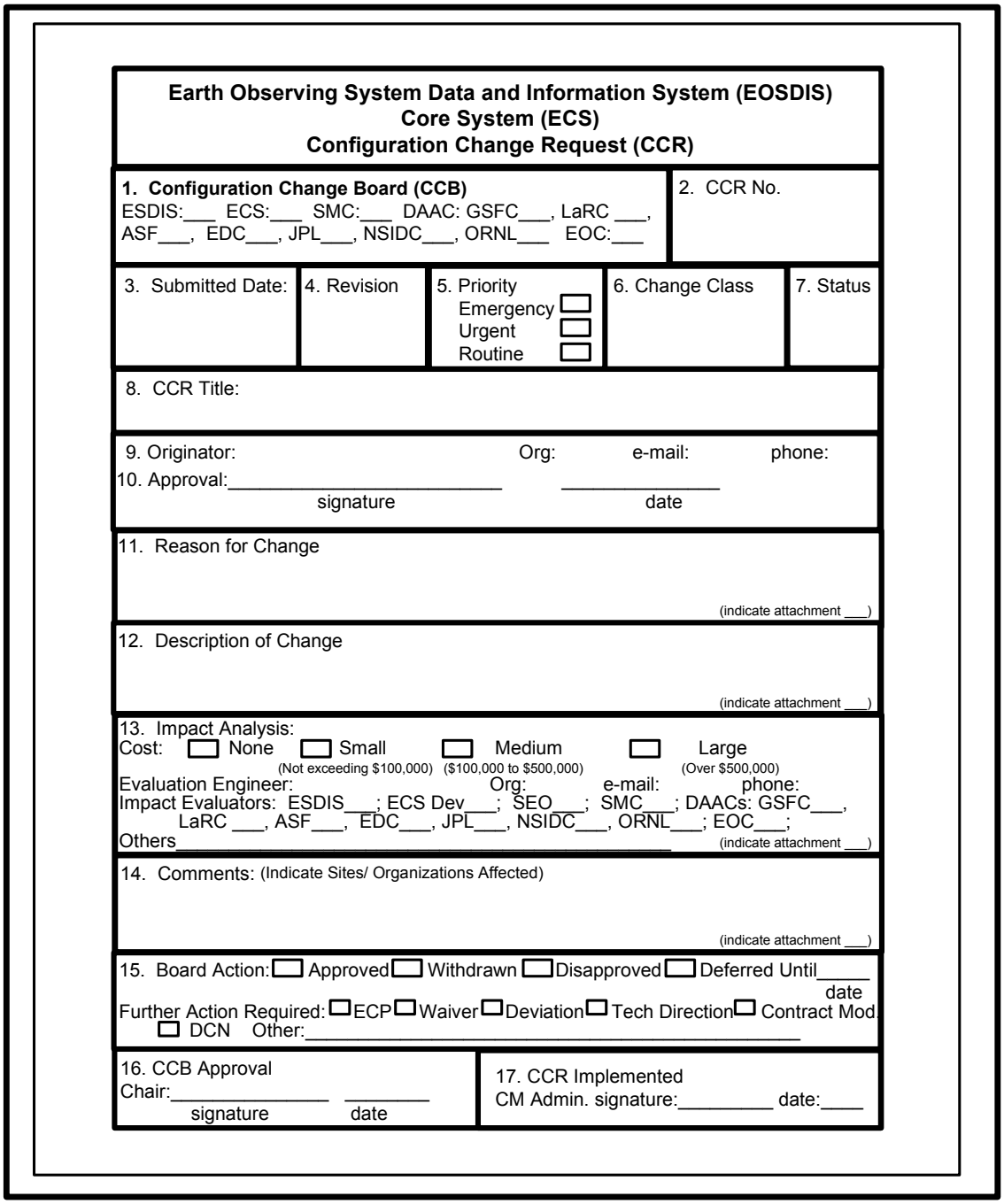
- ECS integrity and quality of service.
- Successful coordination with internal and external networks, systems, and on-site facilities.
- Timely ESDIS CCB visibility into and oversight of ECS operations.
- Convenient user administrative services.

Configuration Change Requests (CCRs)

All requests for change must be documented using a Configuration Change Request (CCR) form.

- Generated against the database, document/drawing, or hardware/software product baseline affected by the proposed change.
- Persons other than the CM Administrator may complete the form electronically using word processing software.
- Numbered items on the form correspond exactly to the data entry required to be performed by the CM Administrator using the Change Request Manager tool.
- Submitted to the appropriate CCB.
- May be used as a cover sheet for deviations and waivers.

A sample of a CCR Form appears in Figure 4.



Earth Observing System Data and Information System (EOSDIS)
Core System (ECS)
Configuration Change Request (CCR)

1. Configuration Change Board (CCB)
ESDIS:___ ECS:___ SMC:___ DAAC: GSFC___, LaRC ___,
ASF___, EDC___, JPL___, NSIDC___, ORNL___ EOC:___

2. CCR No.

3. Submitted Date:	4. Revision	5. Priority Emergency ☐ Urgent ☐ Routine ☐	6. Change Class	7. Status

8. CCR Title:

9. Originator: Org: e-mail: phone:

10. Approval:_____ _____
signature date

11. Reason for Change

(indicate attachment ___)

12. Description of Change

(indicate attachment ___)

13. Impact Analysis:
Cost: ☐ None ☐ Small (Not exceeding $100,000) ☐ Medium ($100,000 to $500,000) ☐ Large (Over $500,000)
Evaluation Engineer: Org: e-mail: phone:
Impact Evaluators: ESDIS___; ECS Dev___; SEO___; SMC___; DAACs: GSFC___,
LaRC ___, ASF___, EDC___, JPL___, NSIDC___, ORNL___; EOC___;
Others_____ (indicate attachment ___)

14. Comments: (Indicate Sites/ Organizations Affected)

(indicate attachment ___)

15. Board Action: ☐ Approved ☐ Withdrawn ☐ Disapproved ☐ Deferred Until_____
date
Further Action Required: ☐ ECP ☐ Waiver ☐ Deviation ☐ Tech Direction ☐ Contract Mod
☐ DCN Other:_____

16. CCB Approval
Chair:_____ _____
signature date

17. CCR Implemented
CM Admin. signature:_____ date:____

Figure 4. ECS CCR Form

Change Request Manager

Figure 5 illustrates the main screen of the Change Request Manager tool, DDTS. Until an upgraded version of Remedy is available and able to support change requests, it is used at the sites to prepare CCRs, and at the SMC to consolidate system-wide CCRs.

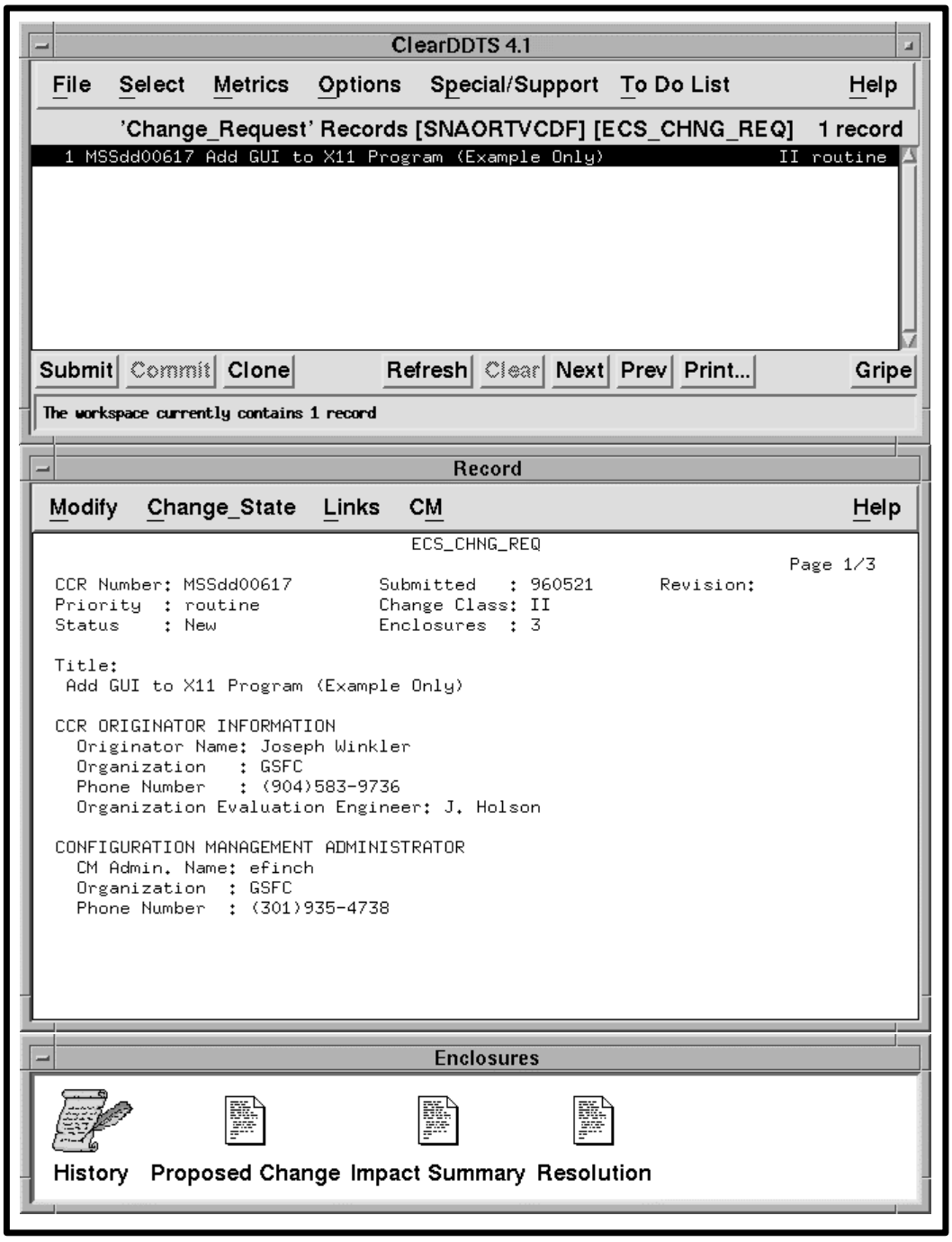


Figure 5. Change Request Manager (DDTS) Main Screen

Suppose experience with ECS has led to discussion and consensus among operators that the label for one of the dialog boxes in one of the custom ECS applications should be changed from "File Selection" to "Production Request Selection." As CM Administrator, you have received a paper copy or electronic mail with a CCR for the proposed change. Use the following procedure and the Change Request Manager to enter the necessary data, compose, and print the CCR.

CCR Preparation

1 On workstation ***x*0mss##**, at the UNIX prompt in a terminal window, type **/usr/ecs/*mode*/COTS/ddts/bin/xddts** at a UNIX command prompt and then press the **Return/Enter** key (where ***mode*** is likely to be **TS1**, **TS2**, or **OPS**).

- NOTE: The ***x*** in the workstation name will be a letter designating your site: **g** = GSFC, **m** = SMC, **l** = LaRC, **e** = EDC, **n** = NSIDC, **o** = ORNL, **a** = ASF, **j** = JPL; the ## will be an identifying two-digit number (e.g., **n0mss02** indicates a management services subsystem workstation at NSIDC). If you access the workstation through a secure shell remote login (ssh), you must enter **setenv DISPLAY <local_workstation IP address>:0.0** prior to the ssh before entering the command after the ssh.
- A default warning dialog box is displayed.

2 Click on the **OK** button.

- The **ClearDDTS** top portion of the **Change Request Manager main screen** is displayed.

3 To submit a new CCR, click on the **Submit** button.

- The **Submit a New Defect** screen is displayed, with the **Submit to which class of projects** field defaulted to **Software**.

4 Type a question mark (i.e.,**?**).

- A selection box is displayed asking for choice of **One of . . . . ALL**, **Change_Request**, **calls**, **company**, **hardware**, **issue**, **request**, **software**, **software.CP**, **todo**.

5 Click on **Change_Request** to select (highlight) it and then click on the **OK** button.

- On the **Submit a New Defect** screen, **Change_Request** is displayed in the **Submit to which class of projects** field.
- The cursor moves to the **Project Name** field.

6 Type **ECS_CHNG_REQ** and then press the **Return/Enter** key.

- The **Record** screen is displayed, showing a system-generated unique **CCR number** and the **Date**, with the cursor at the **Revision** field.

7 The **Revision** field is optional. Because this is the first submission of this CCR, press the **Tab** key to bypass this field.

- The cursor moves to the **Priority** field.

8 The default priority is **routine**, which is appropriate for this CCR. For higher priority CCRs, possible entries are **urgent**, and **emergency**. Press the **Tab** or **Return/Enter** key.

- The cursor moves to the **Change Class** field.

9 The default **Change Class** is **II**, which is appropriate for this CCR. The other option is **I**, for changes handled by ESDIS because of cost, schedule, or mission impacts that may require requirements changes. Press the **Tab** or **Return/Enter** key.

- The cursor moves to the **Title** field. (The **Status** field is system generated.)

10 Type up to 72 characters for a descriptive title for the CCR (e.g., in this case, **Change Dialog Name to Production Request Selection**). Then press the **Tab** or **Return/Enter** key.

- The cursor moves to the **Originator Name** field.

11 Type up to 25 characters (use the login name) to indicate the name of the person who is the author of the proposed change. Then press the **Tab** or **Return/Enter** key.

- The cursor moves to the first **Organization** field.

12 Type up to 30 characters to indicate the name of the originator's organization (e.g., **NSIDC DAAC**). Then press the **Tab** or **Return/Enter** key.

- The cursor moves to the first **Phone Number** field.

13 Type the telephone number where the originator can be reached. Then press the **Tab** or **Return/Enter** key.

- The cursor moves to the **Organization Evaluation Engineer** field.

14 Type up to 25 characters (use the login name) to indicate the name of the person who initially determines whether or not the proposal has merit and should be entered into the DDTS database. Then press the **Tab** or **Return/Enter** key.

- The cursor moves to the second **Organization** field. (The **CM Admin. Name** field is system generated.)

15 Type up to five characters to indicate the name of the CM Administrator's organization (NOTE: Valid values are **ASF**, **EDC**, **EOC**, **GSFC**, **JPL**, **LaRC**, **NSIDC**, **ORNL**, and **SMC**). Then press the **Tab** or **Return/Enter** key.

- The cursor moves to the second **Phone Number** field.

16 Type the telephone number where the CM Administrator can be reached. Then press the **Tab** or **Return/Enter** key.

- The **Proposed Change** enclosure screen is displayed.

17 The **Proposed Change** enclosure screen enables the operator to enter a free-text description of the perceived need or problem and a proposed solution. Use the arrow keys on the keyboard to move the cursor down two lines, and, under the **Need or Problem** heading, type a sentence or two stating that the current title on the dialog box is causing a problem. Then use the arrow keys to move the cursor down under the **Proposed Solution** label, and type a sentence stating the proposal to change the dialog box label to "Production Request Selection."

18 Follow menu path **File→Save Changes and Dismiss Editor** on the **Proposed Change** enclosure screen.

- The contents of the enclosure are saved and the **Change Request Manager main screen** is displayed, with the entered CCR data appearing in the **Record** section.

19 Click on the **Commit** button.

- The CCR Record is stored in the DDTS database and its name appears in the list of **'Change Request' Records** in the top portion of the **Change Request Manager main screen**.

20 Click on the **Print…** button on the **Change Request Manager main screen**.

- The **Printing Options** screen is displayed. This screen provides the operator with the capability to print a highlighted CCR or all of the CCRs in the index on the main screen, either in full-page, index, one-line, or three-line format.

21 Click on the **Print…** button on the **Printing Options** screen.

- The highlighted CCR is sent to the printer.

22 On the hard copy of the CCR, check off the designated CCB for changes processed by the ESDIS CCB and its ECS site-level chartered CCBs at the SMC, DAACs, and EOC. (NOTE: This information is not entered into the Change Request Manager.)

- Select target CCB from among ESDIS, ECS, SMC, EOC, or one of the DAACs (GSFC, LaRC, ASF, EDC, JPL, NSIDC, ORNL).

Impact Analysis

As an adjunct to the CCR process, support of the ESDIS CCB may require the assessment of the impact of a proposed CCR on local or system maintenance and operations. The impact assessment may be conducted by the SEO or site maintenance and operations engineers. However, assessing the impact of CCRs with significant system implications and/or potential system-wide application may require the assistance of the ECS development organization. There is a formal procedure for requesting impact analysis. It requires preparation of a form requesting CCR Impact Analysis. The form is illustrated in Figure 6.

CCR Impact Analysis

Responder Request Number: ____
Responder:_____
Responder Point of Contract:
address:_____
_____
phone:_____
e-mail:_____
CCB Schedule Date:_____
CCR Number:_____
CCR Log Date:_____
CCR Originator:_____
CCR Originator Point of Contract:
address:_____
_____
phone:_____
e-mail:_____

Evaluation Engineer: _____
Evaluation Engineer Point of Contact:
address:_____
_____
phone:_____
e-mail:_____
Requested Return Date:_____

Rough Order of Magnitude (ROM) Impact Analysis

Basis of Estimate:

Technical Assumptions and Comments:

Cost Impact:
None [ ]
Small [ ] < $100,000
Medium [ ] $100,000 < x < $500,000
Large [ ] > $500,000

Schedule Impact:

Technical Assessment: (Your impact analysis should consider the implementation approach; interfaces affected; HW or SW changes required; documentation changes required -- change from/to pages; suggested alternatives, if any; and impact to security features. If your system is not impacted, please provide that information to the CM Administrator.)

Comments:

Signed:_____
(Responder)
Date:_____

Figure 6. CCR Impact Analysis Form

The CCR Impact Analysis Form may be completed electronically using word processing software. When a CCR is distributed to the parties of record (see step 7 under "System-level Change Control" and "Site-level Change Control, pages 10 -14 of this lesson guide), an accompanying Impact Analysis form requests from each Evaluator an assessment of the projected costs and technical impacts of the proposed change. For guidance in preparing impact analysis requests, use the following procedure.

Impact Analysis Request Procedure

1 Determine the sites from which to request impact assessments for the CCR under consideration.

- After the impact assessments are completed, these sites, designated impact evaluators, are entered into the Change Request Manager software (DDTS). The site(s) may be one or more of the following: **SEO**, **ESDIS**, **GSFC**, **LaRC**, **ASF**, **EDC**, **JPL**, **NSIDC**, **ORNL**, **SMC**, **EOC**, **EDF**.

2 Enter the **Responder Request Number** on the first CCR Impact Analysis form.

- The **Responder Request Number** can be an arbitrary sequence number from **1 - 12** which, in conjunction with the **CCR Number**, uniquely identifies the impact analysis request. The numbers **1 - 12** should be used because they correspond to numbers used to enter the impact evaluators into the Change Request Manager after the impact assessments are completed.

3 Enter the **CCB Schedule Date** on the CCR Impact Analysis form.

4 Enter on the CCR Impact Analysis form the **CCR Number** of the CCR to be evaluated.

5 Enter on the CCR Impact Analysis form the **CCR Log Date**.

- The **CCR Log Date** is the date the CCR was submitted.

6 Enter on the CCR Impact Analysis form the data identifying the CCR Originator.

- The data include the name of the **CCR Originator**, **address**, **phone**, and **e-mail**.

7 Enter on the CCR Impact Analysis form the data identifying the Evaluation Engineer.

- This refers to the Organization Evaluation Engineer listed as the Evaluation Engineer on the CCR. The data to be entered include the name of the **Evaluation Engineer**, **address**, **phone**, and **e-mail**.

8 Enter the **Requested Return Date** on the CCR Impact Analysis form.

- The **Requested Return Date** should be set for up to two weeks prior to the CCB Schedule Date, to allow preparation and entry of a summary of all Impact Assessments and to permit submission of the CCR with the CCR Impact Summary to the CCB one week prior to the schedule date for the CCB meeting.

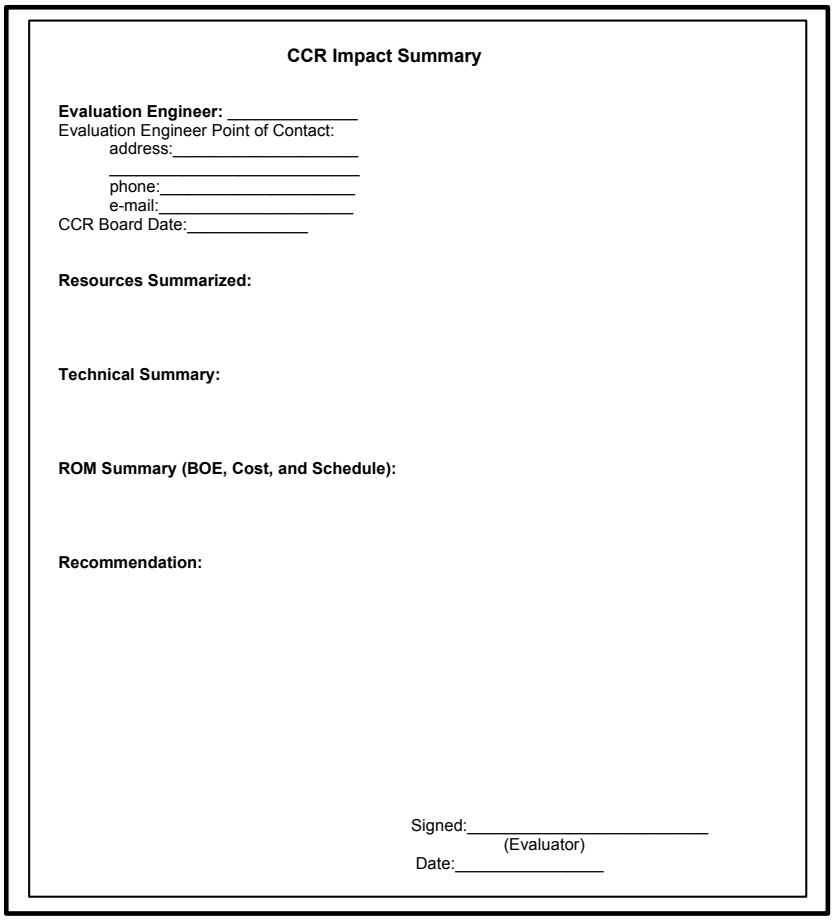
9 Repeat steps 2 - 8 for each additional Impact Evaluator identified in Step 1.

CCR Impact Summary

When the Impact Assessment requests are received at the site(s) of the Impact Evaluators, a responder is assigned to conduct the assessment and prepare the response. The responder conducts the assessment and fills in the necessary data on the Impact Analysis form:

- Responder data.
- Rough Order of Magnitude (ROM) Impact Analysis.
- Technical Assessment.
- Responder signature and date.

The Impact Evaluator returns the CCR Impact Analysis form to the requesting Evaluation Engineer. The Evaluation Engineer uses the returned Impact Analysis data to prepare a CCR Impact Summary form. The form is illustrated in Figure 7.



CCR Impact Summary

Evaluation Engineer: _____
Evaluation Engineer Point of Contact:
address:_____
_____
phone:_____
e-mail:_____
CCR Board Date:_____

Resources Summarized:

Technical Summary:

ROM Summary (BOE, Cost, and Schedule):

Recommendation:

Signed:_____
(Evaluator)
Date:_____

Figure 7. CCR Impact Summary Form

The Evaluation Engineer may complete the CCR Impact Summary form electronically using word processing software. The CM Administrator then uses the Change Request Manager software (DDTS) to enter the Impact Summary and attach it to the CCR. To attach a CCR Impact Summary using the Change Request Manager tool, use the following procedure (*Note*: To change the state of a CCR, you must have CM Administrator privileges).

Preparing a CCR Impact Summary

1 With the Change Request Manager open and its **Record** screen (see Figure 5) showing the data for the CCR (which has been committed to the database), follow menu path **Change_State→Assign-Eval**.

- The **Record** screen displays associated data fields for assigning impact assessment and the cursor at the **Evaluation Engineer** field.

2 Enter the name of the **Evaluation Engineer**.

- Use the login name (up to 8 characters) of the engineer responsible for analzying the proposed system change.

3 Enter the name of the Evaluation Engineer's **Organization**.

- Enter up to 5 characters; must be one of the following: **SEO**, **ESDIS**, **GSFC**, **LaRC**, **ASF**, **EDC**, **JPL**, **NSIDC**, **ORNL**, **SMC**, **EOC**, **EDF**.

4 Other entries on the screen are optional; as desired, enter any of the optional data: Evaluation Engineer's **Email Address**, **Impact Evaluators**, **Sites Affected**, **Related CCR#**, **CI Affected**, **Documents Affected**, **Release Affected**, **Baselines Affected**.

- The **Impact Summary** enclosure screen is displayed.

5 Enter information as desired from the Evaluation Engineer's CCR Impact Summary.

- The **Impact Summary** enclosure screen allows entry of free-text information under headings of **Summarize the impact statements received from the organizations requested to provide impacts**, **Resources Summarized**, **Technical Summary**, **ROM Summary (BOE, Cost, and Schedule)**, and **Recommendation**.

6 Follow menu path **File→Save** to save the enclosure.

- The selected state, **Assigned-Eval**, is now shown as the current state (Status) of the CCR record.

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Software Baselines and Changes

Software releases are deployed through SMC by the ECS CCB or SEO with approval of the ESDIS CCB:

- Version Description Document (VDD) is prepared under the control of the ECS Project CMO by ECS System Engineering and provides a summary documentation package.

- ECS Project CMO or SEO maintenance programmers assemble and package the delivery.

- delivery to SMC, or , with ESDIS permission, directly to the sites.

A number of situations may require a change in software baselines. For example:

- *a COTS software problem* – an operator or user reports (using a Trouble Ticket) a problem with a COTS software package, and the vendor provides a patch to resolve the problem.

- *a custom software problem* – an operator or user reports (using a Trouble Ticket) a problem with custom ECS software, and the resolution involves a software modification.

- *a science software upgrade* – the Science Computing Facility (SCF) develops and provides an upgrade to the science software and the Science Software Support Team recommends its implementation.

- *a COTS software upgrade* – one of the COTS software packages is upgraded by its commercial developer, and the upgrade is shipped by the vendor to the ECS Property Administrator, in accordance with the vendor's contract.

- *a system enhancement* – a science user or one of the DAAC operators proposes an enhancement to one of the ECS custom software configuration items, and, when approved by the ESDIS CCB, the enhancement is developed by the SEO or by the ECS development organization.

Software Transfer and Installation

For any of the scenarios, a software maintenance package that has been prepared by the SEO is transferred from the SMC to a remote site (a DAAC), and later the package is installed on a selected host computer under a CM-controlled process. Figure 8 illustrates the functional flow for the transfer.

- Change originates at the SEO, beginning when the SMC CM Administrator receives the software maintenance change.
- SMC CM Administrator provides ECS system-wide CM and exercises control and/or monitoring over the configurations.
- SMC CM Administrator directs transfer to a designated DAAC drop-off point, the on-site software library.
- Site CM Administrator ensures that changes are properly documented and coordinated, and maintains control of all configured hardware and software.

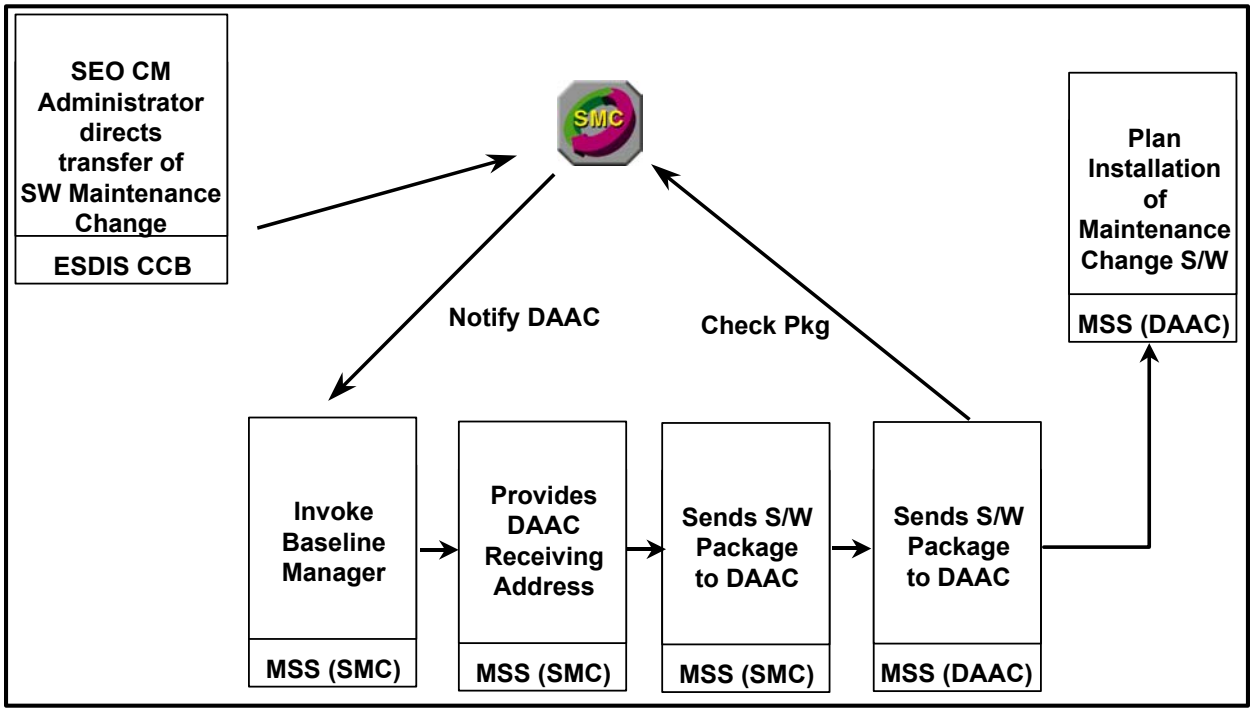

Figure 8. Software Transfer Functional Flow

Figure 9 illustrates the functional flow for installation.

- At the DAAC, the installation actions are executed by the DAAC Software Maintenance Engineer.
- The installation is under direction from the DAAC CCB.
- The DAAC CM Administrator ensures that changes are properly documented and coordinated, maintains control of all configured hardware and software, and assists in the development and administration of the library with respect to CM procedures.
- The DAAC Software Maintenance Engineer produces, delivers, and documents corrections, modifications, and enhancements made to ECS software (including COTS products), and/or adapts or incorporates COTS software for ECS use.
- The DAAC System Test Engineer develops and executes tests of received software changes with the support of DAAC operators, and submits requests to the DAAC Resource Planner for installation scheduling.

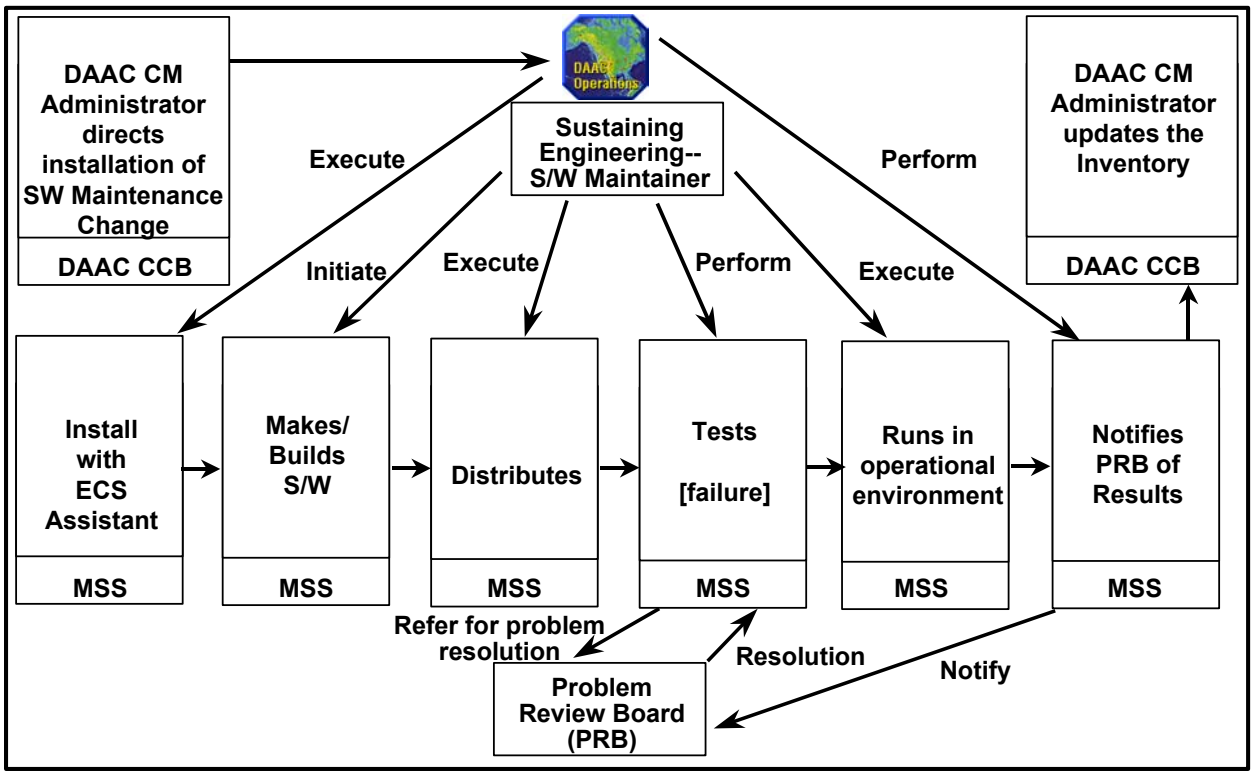

Figure 9. Software Installation Functional Flow

Software Transfer

When the SEO has completed preparation of a software maintenance change package for a change approved by the ESDIS CCB, the SEO CM Administrator requests that the SMC distribute the package. The SMC CM Administrator promotes the change into the Operational Baseline and updates the Baseline Record and Inventory Record using the Baseline Manager tool and Inventory/Logistical Management tool.

Update the SMC Software Baseline Record

The next step is to update the Baseline Record to document the software baseline change. The process, tool, and procedure for accomplishing this update are described in detail in a subsequent subsection on Changes to the Baseline. When the Baseline Record update is complete, the SMC CM Administrator completes the transfer.

- Notifies the remote site(s) that will receive the change package.
- Checks the software change package for completeness before dispatch.
- Dispatches the package to the remote site(s).
- Receives confirmation that the package has been received.

Installation at Site

Installation is dependent on Review and approval by ESDIS, and then proceeds systematically:

- the Version Description Document (VDD) gets final updates for system and center-specific material identified by ESDIS or the operational centers, and the final VDD is published.
- the build is installed, along with operational and user documentation.
  - ECS Assistant for installation.
  - Scripts for System Administrator to do installation.
- controlled document updates are provided to SEO Document Maintenance and entered into the CM system.
- the CM system is updated to reflect M&O and center-specific baselines.

Subsequently, the DAAC Software Maintenance Engineer implements and tests the new software:

- Tests individual packages (unit, subsystem, system).
- Runs the full final software in the operational environment.
- Notifies the SMC of the results.

Finally, the DAAC CM Administrator updates the site inventory record using the Inventory/Logistical Management (ILM) tool, as described in detail in a subsequent subsection on Changes to the Baseline.

Configuration Parameters and the Configuration Registry

There are many configurable parameters associated with ECS software. Some of them are set by default to values that may be appropriate for most operating conditions. Others may be set to values that may or may not be appropriate for the requirements of operations at a particular DAAC. Some parameters may be changed using ECS Graphical User Interfaces (GUIs) specifically designed to monitor and control functions related to particular subsystems. Others may require changes to a configuration file (i.e., edit the file using UNIX vi editor) or database (typically done by the Database Administrator). ***Note: Before changing any configuration parameter, make certain either that it is not under configuration control or that you have obtained any necessary approval specified in local Configuration Management policies and procedures.***

Configuration Registry

ECS configuration parameters are manageable by a *Configuration Registry*. The Configuration Registry Server provides a single interface to retrieve configuration attribute-value pairs for ECS Servers from the Configuration Registry Database, via a Sybase Server. The Configuration Registry Server maintains an internal representation of the tree in which configuration attribute-value pairs are stored. General configuration parameters used by many servers are stored in higher nodes in the tree. Parameters specific to a single ECS Server are contained in the leaf nodes of the tree. ECS provides a script tool to load the Configuration Registry database from data in configuration files. This loading is a one-time event to populate the Registry database with the information contained in .CFG files (future releases of ECS will store additional information, perhaps from .ACFG and .PCFG files). Once the Configuration Registry is loaded, if the configuration files are moved or otherwise made inaccessible to the software, the software goes to the Configuration Registry to obtain needed configuration parameters. There is also a Configuration Registry GUI to view and edit configuration data in the database. Changes to the Configuration Registry typically are under the control of Configuration Management and the Database Administrator.

Figure 10 shows the Configuration Registry login window and GUI. Data in the Registry database are stored hierarchically, sorted by hostnames. An application may have multiple entries, each under a different hostname where it runs. The GUI queries the database directly. The GUI shows the Attribute Tree on the left. It displays parameters and their values in the Attribute Listing on the right. It provides the operator with capability to create, read, update, and delete database entries. A click on a parameter name in the Attribute Listing launches a pop-up window, shown in Figure 11, permitting the operator to update or delete the parameter.

There is also a command-line query tool provided with the Configuration Registry. It was created to work with certain scripts (e.g., DSS CheckArchive, Rmesdt, Addesdt) and would not normally be used to view parameters.

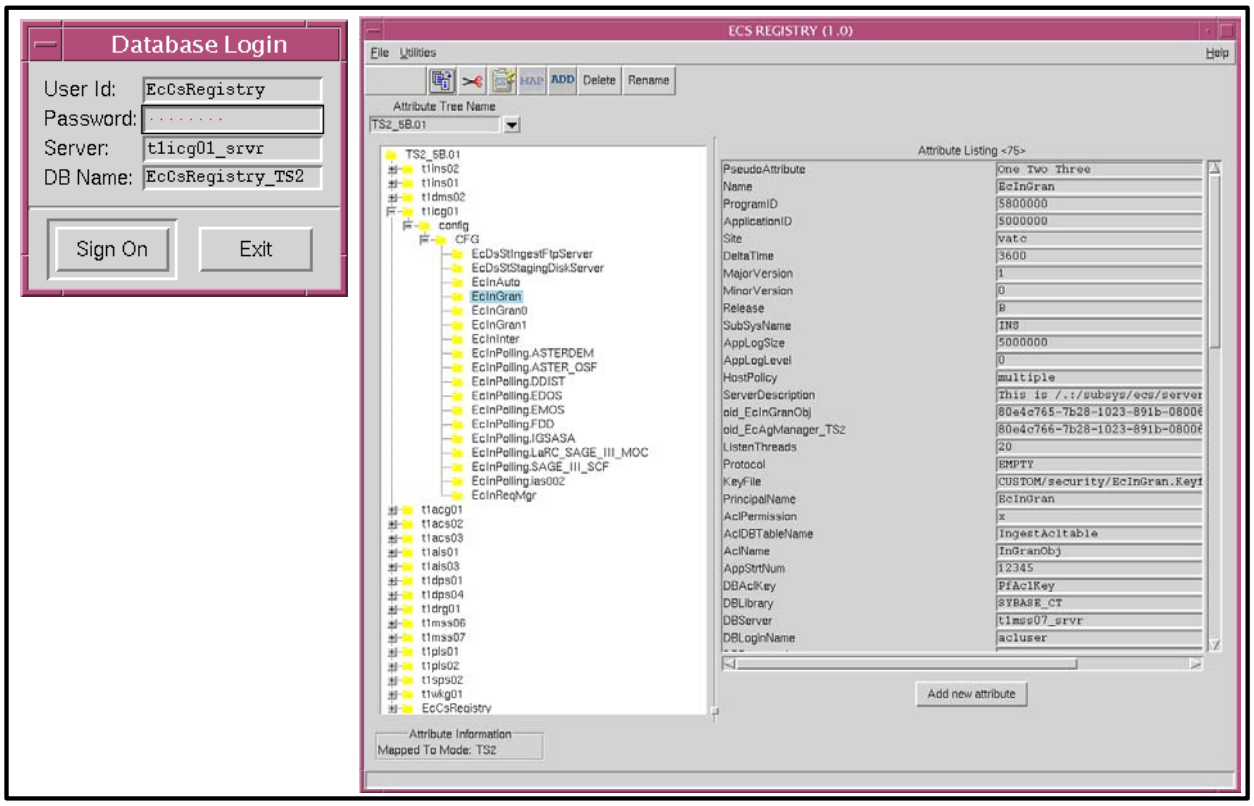

Figure 10. Configuration Registry Login Window and GUI

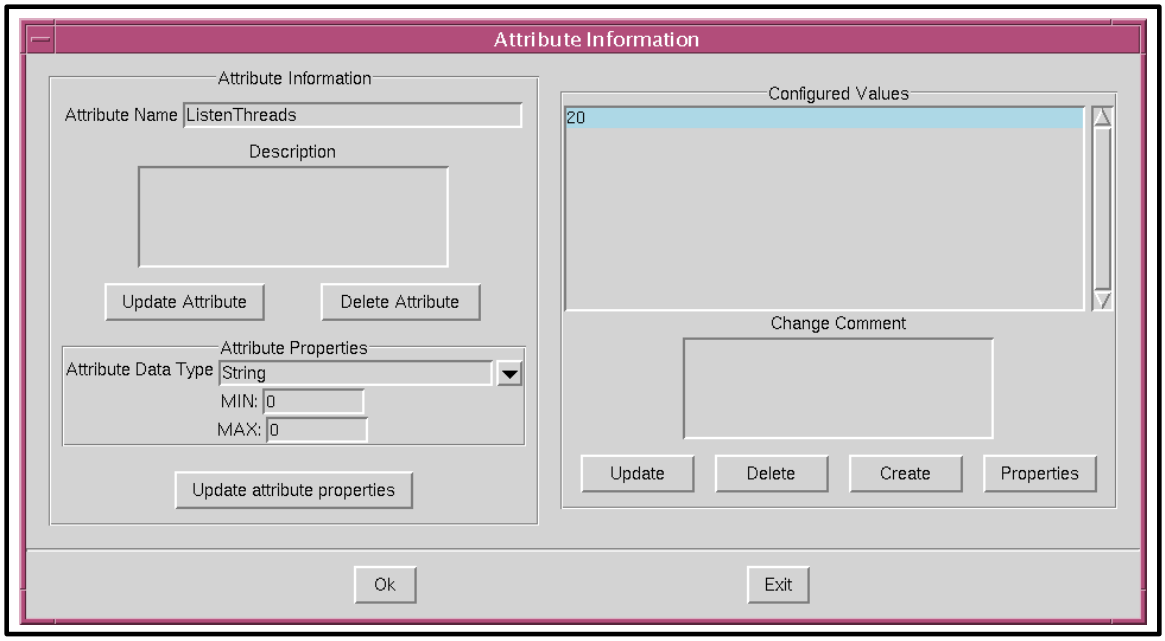

Figure 11. Configuration Registry Attributes Pop-Up Window

Use the following procedure to launch the Configuration Registry GUI and display configuration parameters.

Display Parameters using the Configuration Registry GUI

1 On workstation ***x*0dms##**, at the UNIX prompt in a terminal window, type **/usr/ecs/*mode*/CUSTOM/utilities/EcCsRegistryGUIStart *mode* &** at a UNIX command prompt and then press the **Return/Enter** key (where ***mode*** is likely to be **TS1**, **TS2**, or **OPS**).

- NOTE: The ***x*** in the workstation name will be a letter designating your site: **g** = GSFC, **m** = SMC, **l** = LaRC, **e** = EDC, **n** = NSIDC, **o** = ORNL, **a** = ASF, **j** = JPL; the ## will be an identifying two-digit number (e.g., **g0dms03** indicates a data management subsystem workstation at GSFC). If you access the workstation through a secure shell remote login (ssh), you must enter **setenv DISPLAY <local_workstation IP address>:0.0** prior to the ssh before entering the command after the ssh. The **<*ipaddress*>** is the ip address of ***x*0mss##**, and **xterm** is required when entering this command on a Sun terminal.
- The Database Login window is displayed with entries filled in for **User Id:** (e.g., **EcCsRegistry**), **Server:** (e.g., ***x*0icg02_srvr**), and **DB Name:** (e.g., **EcCsRegistry_*mode***).

2 In the Database Login window, click in the **Password:** field and type the password.

- The typed password is not displayed (dots are displayed in place of the password).

3 Click on the **Sign On** button.

- The Database Login window is closed and the Configuration Registry GUI is displayed.

4 On the tree showing system hosts displayed on the left side of the GUI, click on the "+" sign next to one of the hosts for which parameters are to be displayed.

- The tree displays a **config** branch.

5 Click on the "+" next to **config**.

- The tree displays a **CFG** branch.

6 Click on the "+" next to **CFG**.

- The tree displays the computer software components for the selected host.

7 Click on one of the listed components (or its folder icon).

- The **Attribute Listing** field displays the configuration parameters associated with the selected component. If there are a large number of parameters, the right side of the window will have a scroll bar that may be used to scroll down the list.

8 Click on one of the listed parameters.

- The **Attribute Information** pop-up window for the selected parameter is displayed, showing detailed information concerning the parameter.

- If you are logged in with an account authorized with appropriate permissions, the **Attribute Information** window permits changing or deleting the parameter.

9 To exit from the Configuration Registry GUI, follow menu path **File→Exit**.

Hardware Baselines and Changes

The hardware baseline is established at Release Readiness Review (RRR) following formal Physical Configuration Audit (PCA) and Functional Configuration Audit (FCA).

- ESDIS approves the establishment of the operations baseline.
- the configuration baseline is recorded in the Engineering Release Record.
- M&O conducts testing of builds to ensure proper implementation of CCRs with no defects introduced.

Changes to the hardware baselines are anticipated to be infrequent, because the hardware is primarily COTS. In the event of hardware failure, if the repair can be made with a part of the same make, model, and version as the faulty one, there is no need for a CCR because the baseline remains the same. Under some circumstances, however, a CCB action may be necessary. For example:

- *a COTS hardware repair that requires a CCR* -- a COTS hardware problem that is repaired, under emergency conditions and with the approval of the site manager, with a part that does not conform to the baseline (e.g., timely repair is essential and the only spare part available is a later version) requires a CCR to document the configuration change and the authority for the change.
- *a system enhancement* – any change in hardware configuration that occurs in a new release, or as an upgrade, requires a CCR.

Hardware Installation

Repair with part of same make, model, version may be made by the vendor's maintenance technician; the Maintenance Engineer simply records the action and enters the serial number of the new part in the property management system.

If no spare of the baseline make, model, and version is available to make a timely repair for a system that must be returned to service immediately, but a workable part is available (e.g., a later version), the site manager may authorize that part to be used for repair if tests conclude that it works properly. Nevertheless, this constitutes a change that requires the following CM actions:

- preparation of a CCR to document the change.
- review/approval by the site CCB.
- review by SEO/ESDIS to assess impacts/applicability to other sites.
- provision of controlled document updates to SEO Document Maintenance and entry into CM.
- CM system updates (e.g., baseline, inventory) to reflect the approved change.
- Audits (i.e., FCA/PCA) supported as described previously.

Changes to the Baseline

Changes to configuration items typically require use of several software tools for their management, implementation, and documentation. We have seen how the Change Request Manager, DDTS, is used for Configuration Change Requests, and how the ECS Assistant is used for the installation of approved software changes. This subsection provides a brief review of the role of the Management Subfunction Trouble Ticket software in baseline changes, and then briefly addresses the use of two additional tools used primarily at the development facility:

- the Baseline Manager (BLM)– a Clearcase application for maintaining data defining the ECS baseline and recording changes to that baseline.
- the Inventory/Logistical Management (ILM) tool – a Remedy application for maintaining records related to inventory changes (e.g., item identification data, such as serial numbers, part numbers, manufacturers, vendors, or other data).

Management Subfunction and Trouble Ticket System

You will no doubt remember that the impetus for a change may often be a system event that results in a Trouble Ticket. Many changes involve the management subfunction software. Specifically, the management software includes the Trouble Ticket System (TTS), which is a tool used at the DAACs, SMC, and EOC to record and report problems with ECS. Most of the problems encountered are fixed locally, but some problems involve system-level issues. For those, the SEO may use a TT Telecon to discuss the issues. Problems that may have such system-level implications are those that may be related to groups of trouble tickets (TTs), that may affect more than a single site, that must be referred to the ESDIS Project Office and the ECS development organization, or that require coordination for multi-site change implementation.

Figure 12 shows the flow of a TT and related CCR through the various CCBs and the TT Telecon. Circled numbers on the figure indicate key elements in the flow:

1. An approved TT is discussed at a TT Telecon.
2. At the Telecon, a decision is made whether to escalate the resolution of the TT.
3. If the decision is to escalate, rather than resolve the issue with a local solution, a CCR is proposed.
4. A CCR Telecon and related deliberations may result in iterations of rework, entailing related CCRs, responsibility for the affected configuration items, impact analysis, and other activities to optimize the resolution.
5. The site CCB deliberates on the CCR.
6. The site CCB forwards the CCR with recommendations to the ESDIS CCB.

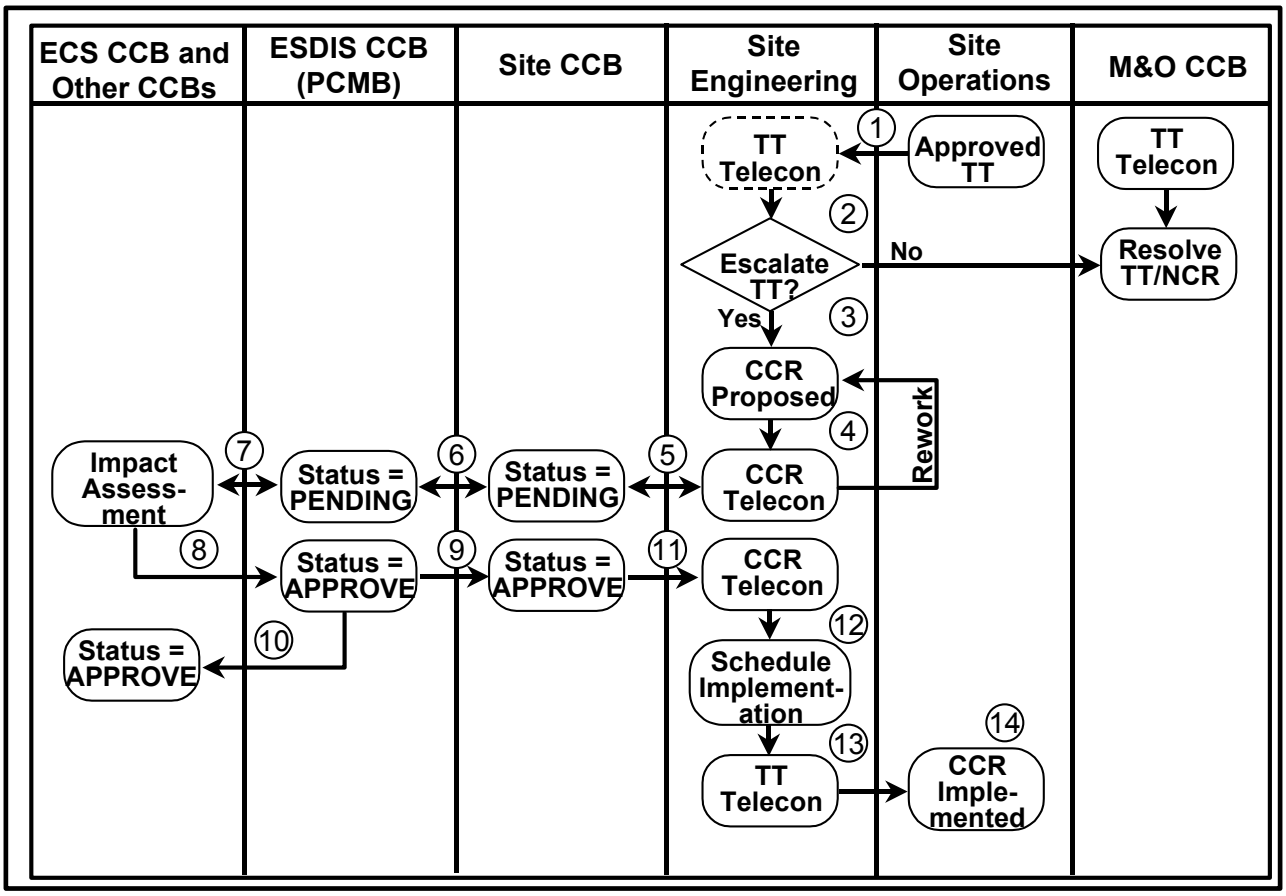

Figure 12. CCR Approval Flow

7. As necessary, the ESDIS CCB forwards the CCR to the ECS CCB and other CCBs for impact assessment.
8. If appropriate, elements 5, 6, and 7 may be iterated in rework with additional deliberations and feedback, with possible disapproval. Otherwise, the CCR is approved for further action by the ESDIS CCB.
9. If the ESDIS CCB approves the CCR, it may issue CCR Implementation Instructions to the site CCB.
10. If the CCR entails additional development affecting ECS, the ESDIS CCB may issue CCR Implementation Instructions to the ECS CCB and/or other CCBs.
11. The site CCB issues CCR implementation directives, and their status is monitored and coordinated with the SEO through a CCR Telecon.
12. The CCR Telecon also coordinates the schedule for implementation of changes that is reported back to the TT Telecon.
13. The TT Telecon monitors the scheduled implementation.
14. At the conclusion of the scheduled implementation, the CCR is verified.

Baseline and Inventory Management: Processes

The ECS provides BLM and ILM tools to assist in documenting changes to the baseline and inventory, and to maintain a historical record of those changes. The BLM tools are used at the ECS Development Facility (EDF) and/or the System Monitoring and Coordination (SMC) function to maintain system-level records and site-level records; baseline reports are accessible at the operational sites. The M&O staffs at the DAACS, EOS Operations Center, and the SMC use ILM tools to maintain records that describe all inventory items, as well as their Equipment Inventory Number (EIN) structures, repair histories, and locations.

Baseline Terms and Concepts

Baseline management is a process to identify and control baselined versions of hardware and software, to provide a standard configuration of systems throughout all sites, and allow unique site-configured systems and baselines. It identifies interdependencies between hardware and software items, and permits maintenance of a complete history of baseline changes throughout the life of the project. For ECS baseline management and BLM tools, certain terms and concepts are key to understanding how data on the system baseline are stored and tracked.

Control Item –	any ECS item under version control by Configuration Management.
Configuration Item –	an aggregation of hardware, firmware, software, or any discrete component or portion, which satisfies and end user function and is designated for configuration control.
Baseline –	a configuration identification document or set of such documents formally designated by the Government at a specific time during the life cycle of a configuration item (CI).
Configured Article –	a control item reportable as part of the Configured Articles List (CAL).
CIL –	a Configuration Items List (CIL) identifies the approved set of CIs that are subject to CM requirements and procedures.
CAL –	a Configured Articles List (CAL) describes all CIs, critical item hardware and software, and supporting documentation by which the exact configuration definition of the hardware and software can be determined.

Additional terms, some of which address specific entries in the BLM tool, further define how data on the system baseline items and structure are tracked.

Assembly –	an item made up of other items. A *Parent* item is a higher-level item (e.g., an assembly), which may have one or more *Child* items, or components.
Bill of Material –	the list of items that comprise an assembly.

Product Structure – the parent-child pairings that define the bill of material for an assembly; each product structure record specifies the effective dates and quantities for a single component of a parent for each engineering change.

Active Date – the date a component becomes effective in an assembly's bill of material.

Inactive Date – the date a component is no longer effective in an assembly's bill of material.

Engineering Change – a mechanism for grouping, reporting, and controlling product changes collectively

Revision – the sequence number of a product structure change to an assembly; it signifies a change to the configuration of an assembly that does not alter its form, fit, or function.

Implementation Status – a record describing the deployment of a control item to a site and the current state and associated date of its implementation; each control item has one record for each site to which it is deployed.

Exporting Data – creating a formatted file or records extracted from the BLM database; control item engineering change, product structure, and interdependency records may be extracted and sent to another BLM site via ftp.

Importing Data – loading BLM data from a formatted file.

At the lowest level, the baseline is composed of configured articles that are the specific types of items that make up ECS and are tracked using the BLM tool. It is important to recognize, however, that we impose a conceptual structure on those configured articles to help us think about the system. In fact, it is possible to conceptualize the structure of the system in a number of different ways, and we may select a different conceptual structure based on the requirements of the situation. The ECS baseline management approach and the BLM tool permit recording and tracking these different conceptual baselines, which can be related to the same records of the configured articles.

For example, system designers may conceptualize the system in terms that will help them track subsystems and the configuration items for which each subsystem team is responsible. This may produce a baseline structured according to a design view, such as that illustrated in Figure 13.

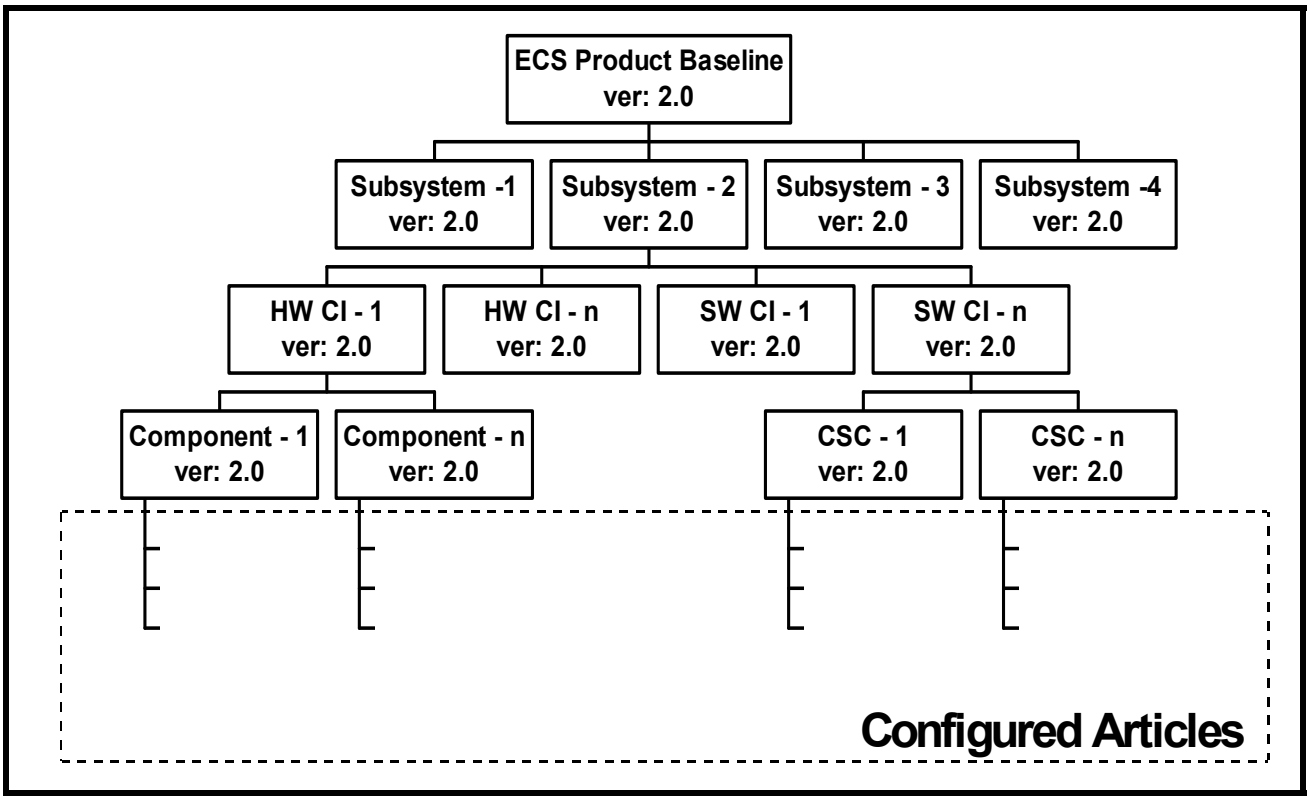

Figure 13. ECS Baseline Concept from a Design (CIL/CAL) View

At an operations site, the concept reflected in the upper layers of the Design View baseline structure may not be particularly useful. Although the same configured articles are involved, it may be desirable, for instance, to track items from the viewpoint of network administration. The resulting baseline product structure may reflect that shown in Figure 14.

Even if an operations site is to view ECS product structure as composed of subsystems, it is likely that the concept of CIs will be of little use. Instead, the site is likely to be focused on what hosts make up the subsystems. Therefore, the subsystem view at an operations site may be similar to that illustrated in Figure 15.

The Baseline Manager database implemented at the ECS Development Facility reflects ECS-developed product structures, and site personnel may not normally need all the data necessary to define these product structures. Instead, BLM tasks are likely to be limited to areas such as noting system changes, perhaps in the context of site-unique requirements and data. However, an understanding of the different ways of conceptualizing the system will help in interpreting baseline data reflected in the BLM.

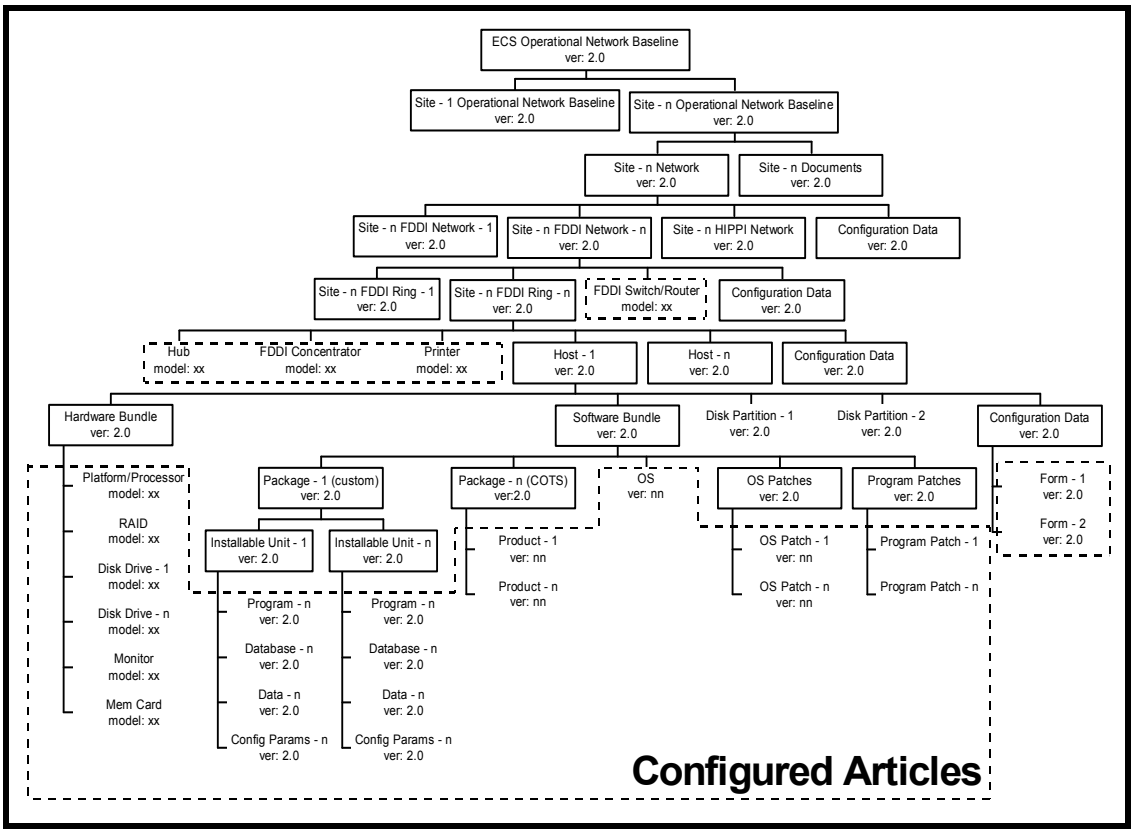

Figure 14. ECS Baseline Concept from an Operational (Network) View

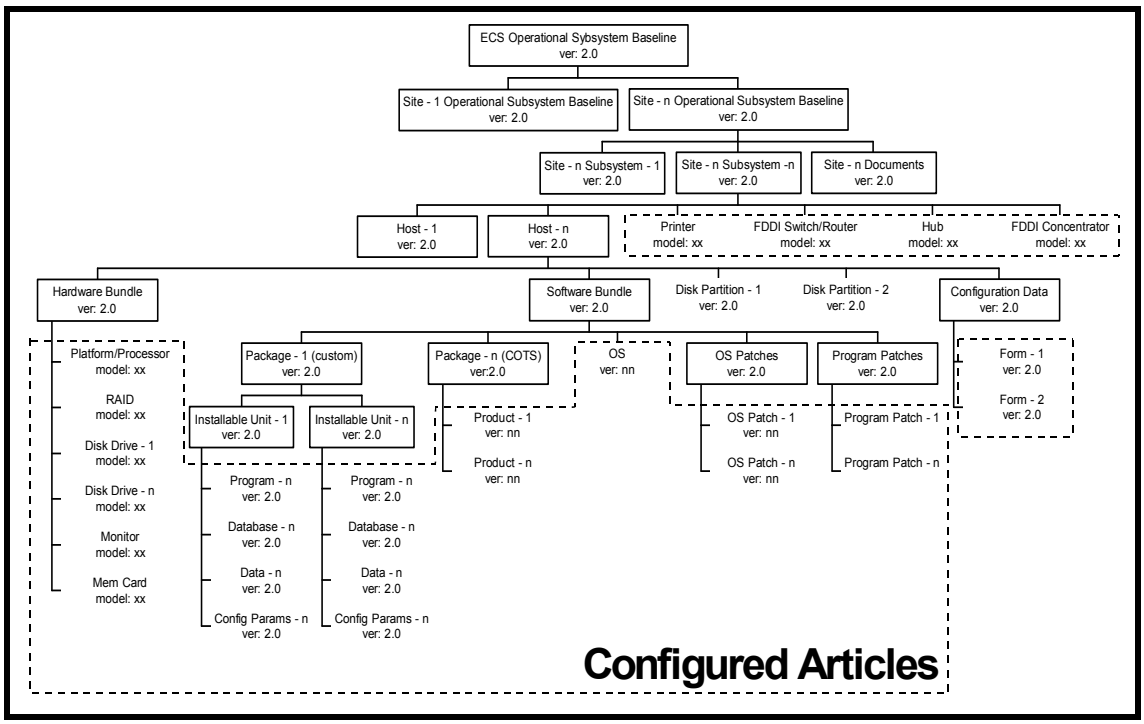

Figure 15. ECS Baseline Concept from an Operational (Subsystem) View

Baseline and Inventory Management: Tools

The Baseline Manager (BLM) tool is an application of *ClearCase*, and the Inventory/Logistical Management (ILM) tool is an application of *Remedy*. The BLM tool provides access to functions for maintaining control item and bill of material information. The ILM tool provides access to functions including entry and management of EIN (Equipment Identification Number) information and management of the EIN structure for the ECS inventory.

The BLM manages the COTS software, operating system patches, and COTS software patch baselines. The BLM records, including information on all scripts, data, and GUIs, are maintained and managed at the EDF using ClearCase. The BLM tool produces some of the 910/920 Technical Document reports, with automated posting to ECS Baseline Information System (EBIS) and replication to server **cmdm.east.hitc.com**. The reports include the following documents that affect all sites:

- COTS Software Version 910-TDA-003.
- Site-Host Map 910-TDA-005.
- Critical COTS Software List 910-TDA-023.
- COTS S/W Where-Used Report 910-TDA-030.

The reports also include the following documents that are site specific:

- Hardware-Software Maps 920-TD(*x*)-002.

  (*Note*: The *x* represents a letter designating specific DAACs. *e.g.*, g = GSFC, l = LaRC, e = LP DAAC, and n = NSIDC.)

- Hardware-Patch Maps 920-TD(*x*)-014.

All BLM records are related to approved Configuration Change Requests (CCR) and Release Notes documents (i.e., series 914-TDA-xxx).

The Configuration Management (CM) organization is the principal user of the BLM tool, using it to implement changes to the baseline. The system is used daily to describe CCB-approved system components and to track sites and machines where version-controlled items are baselined. In addition BLM supports other functions such as configuration audits, system engineering and deployment activities. The BLM records describe the hosts for each site. The sites are the operational Distributed Active Archive Centers (DAACs), Verification and Acceptance Test Center (VATC) and Performance Verification Center (PVC). The system also tracks the COTS software and patches that are mapped to their respective hosts. The EBIS accommodates the identification of other baselined items such as documents, and disk partitions.

The BLM capabilities are used to:

- maintain records that identify what items comprise individual, baselined, system configurations

- identify the versions and variants of hardware and software items that are currently baselined together with the assemblies (e.g., hosts, subsystems, and networks) that use them
- record item interdependencies and the sites to which baselined items are deployed
- keep chronological histories of baseline changes and traceability of items to predecessor versions and system releases

The ILM capability is implemented with the Remedy COTS package. The M&O organization is the principal user of ILM capabilities. The ILM tools are deployed at the EDF in Landover, the DAACs and the SMC. The system is used daily at the EDF for maintaining property, repair, and software license data about ECS contract purchased items. The sites use the ILM tools locally to create Maintenance Work Orders (MWOs) that record equipment maintenance activity. The EDF maintains the principal data repository and processes all inventory changes. All MWO changes are sent daily from the DAACs and merged into a consolidated ILM database. The ILM data changes made at the EDF are distributed daily to affected sites.

The ILM capabilities are used to:

- track and maintain all of the key data pertaining to ECS contract purchased equipment including hardware, COTS software and software licenses, COTS documentation (hardware and software), spares and consumable items, and Government Furnished Equipment
- store and maintain detailed maintenance data on hardware, to the component level, including corrective maintenance
- keep chronological histories (a record of transactions) of receipt, installation, and relocation of inventory items

Baseline Manager (BLM) Outputs Useful at the Sites

When the ECS software baseline is changed (e.g., addition of a script, update or replacement of a Graphical User Interface (GUI) package), the change must be reflected in the collection, or "catalog," of control items that make up the affected Computer Software Component (CSC) assembly in the ECS product structure. In the BLM software at the EDF, to document the change it is necessary to add the new element to the catalog of version-controlled items, define an engineering change for the CSC assembly, and include the element in the list of items that will now make up that assembly. Once the change is documented, baseline reports reflect the new information. These reports may be accessed through the ECS CMDM server for the ECS Baseline Information System (EBIS). Figure 16 illustrates the Netscape window for the ECS CMDM server page. Note the **ECS Baseline** button at the end of the Tools line near the top.

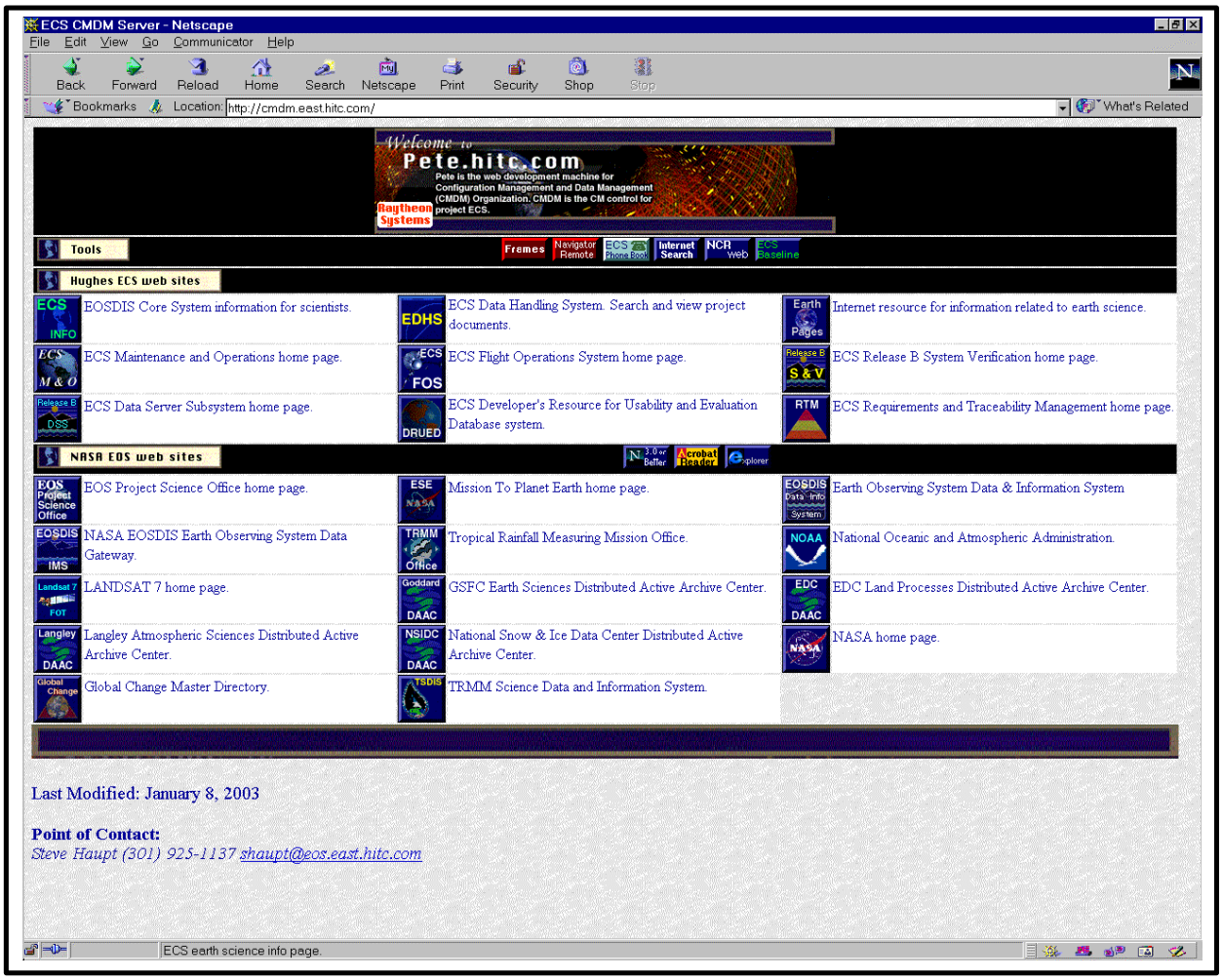

Figure 16. ECS CMDM Server Page

A click on the **ECS Baseline** button results in the display of the EBIS page, as illustrated in Figure 17. On the EBIS page, the ECS Baseline Information Technical Documentation is accessible through use of the **Technical Documents** button at the top of the row of buttons on the left side.

Figure 17. ECS Baseline Information System (EBIS) Page

A click on the **Technical Documents** button results in the display of the list of technical documents. Figure 18 shows the top of the list on the **ECS Baseline Technical Documentation** page. As illustrated, the page lists the document series, title, and document number. The document numbers are links that provide access to the listed documents. Note that the titles of some documents indicate BLM origin by inclusion of the parenthetical notation **(ClearCase)**.

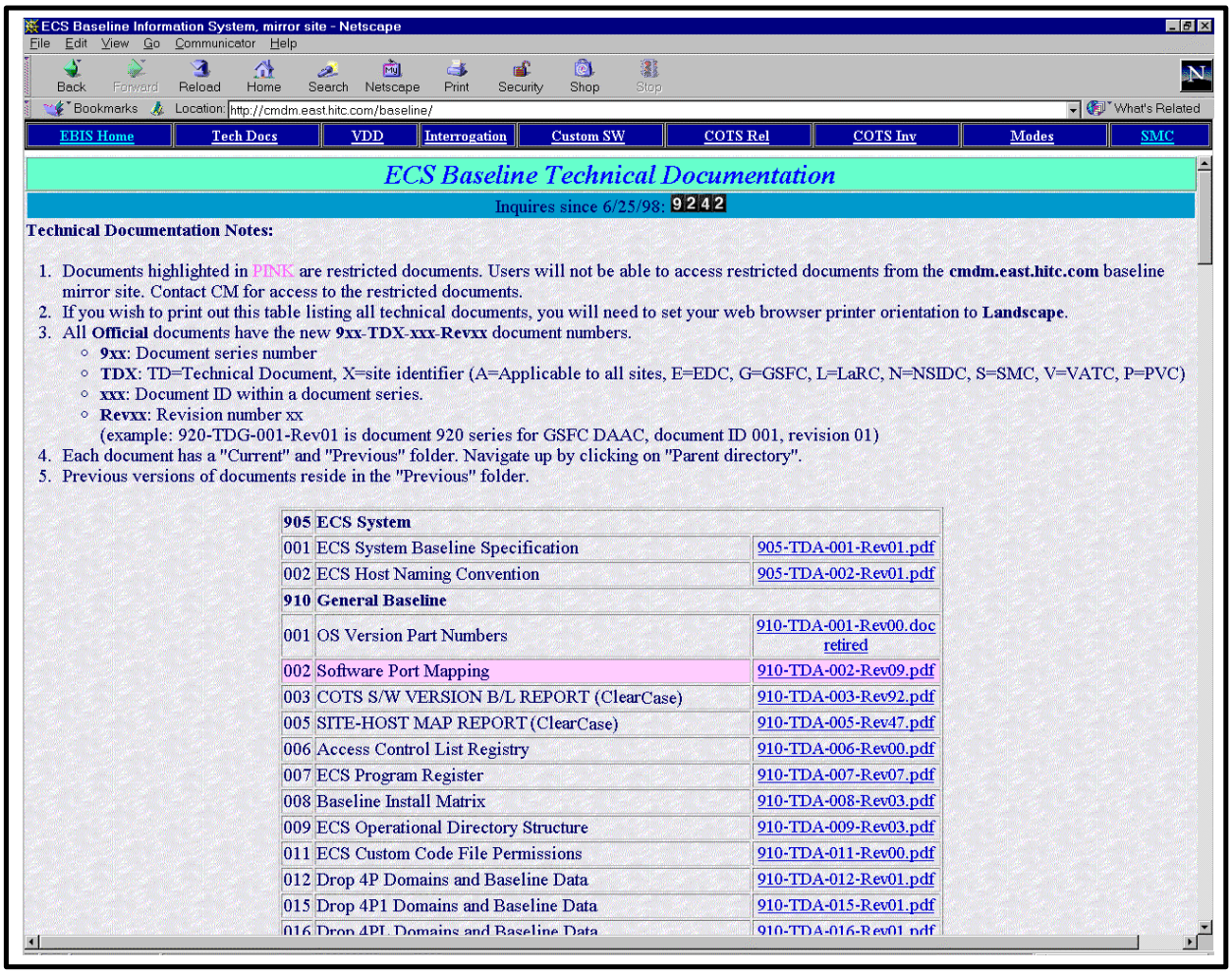

Figure 18. EBIS List of Technical Documents

The following procedure is applicable for retrieving baseline reports.

Obtain ECS Baseline Reports

1 At the UNIX command shell prompt, type **setenv DISPLAY *clientname*:0.0** and then press the **Return/Enter** key.

- For ***clientname***, use either the local terminal/workstation IP address or its machine name.

2 Start the log-in to a Netscape host by typing **/tools/bin/ssh *hostname*** *(e.g.*, g0ins02, e0ins02, l0ins02, n0ins02) at the UNIX command shell prompt, and press the **Return/Enter** key.

- If you receive the message, **Host key not found from the list of known hosts. Are you sure you want to continue connecting (yes/no)?** type **yes** ("**y**" alone does not work).
- If you have previously set up a secure shell passphrase and executed **sshremote**, a prompt to **Enter passphrase for RSA key '<*user@localhost*>'** appears; continue with Step 3.
- If you have not previously set up a secure shell passphrase; go to Step 4.

3 If a prompt to **Enter passphrase for RSA key '<*user@localhost*>'** appears, type your ***Passphrase*** and then press the **Return/Enter** key. Go to Step 5.

4 At the **<*user@remotehost*>'s password:** prompt, type your ***Password*** and then press the **Return/Enter** key.

- You are logged in and a UNIX command shell prompt is displayed.

5 Type **netscape &** and then press the **Return/Enter** key.

- The Netscape web browser is displayed.

6 Click in the **Netsite:** field.

- The field is highlighted.

7 Type the Universal Resource Locator (URL) for the ECS Baseline Information Server (**http://cmdm.east.hitc.com**) and then press the **Return/Enter** key.

- The **ECS CMDM Server** home page is displayed, offering access to ECS Baseline information as well as a number of tools, ECS web sites, and NASA EOS web sites.

8 On the Tools line, click on the **ECS Baseline** button.

- The **ECS Baseline Information System** page is displayed

9 Click on the **Technical Documents** button.

- The **ECS Baseline Technical Documentation** page is displayed.

10 Locate the desired report, scrolling down as necessary.

- Reports derived from the BLM may be indicated with a parenthetical notation **(ClearCase)** in the title entry.

11 Click on the link for the document to be accessed.

- A directory is displayed with one or more document numbers and versions indicated as links.

12 Click on the link for the document and version desired.

- The document is displayed, and can be printed and searched.

Inventory/Logistical Management (ILM)

The ILM system is used to enter and maintain property records for all items in the ECS inventory. This includes not only equipment items tagged with physical serial tags, but also non-physical items, which although they cannot be physically tagged, must be tracked as inventory items (e.g., software items). At each site, each item requiring serial tag control, whether an actual tag control or an assigned number provided by the system, must have an Equipment Identification Number (EIN). The illustration in Figure 19 shows the Remedy **Open** dialog, from which the operator can select an item to launch the ILM-EIN Entry form displayed in Figure 20.

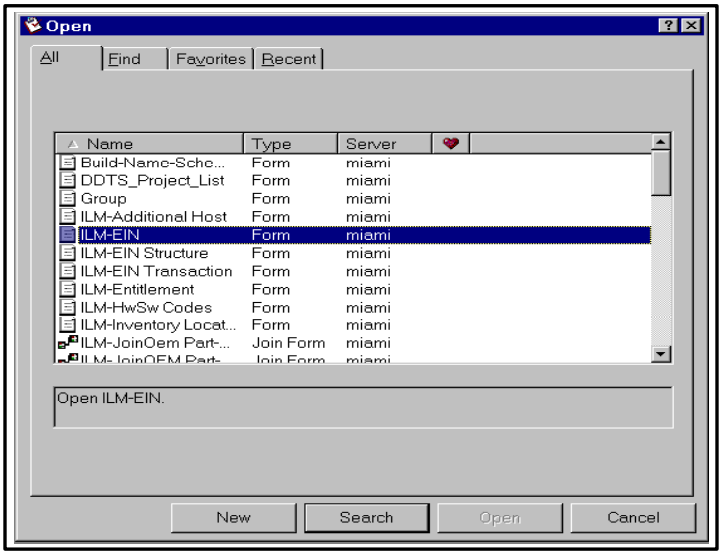

Figure 19. Remedy Open window (Note: Not all choices may appear)

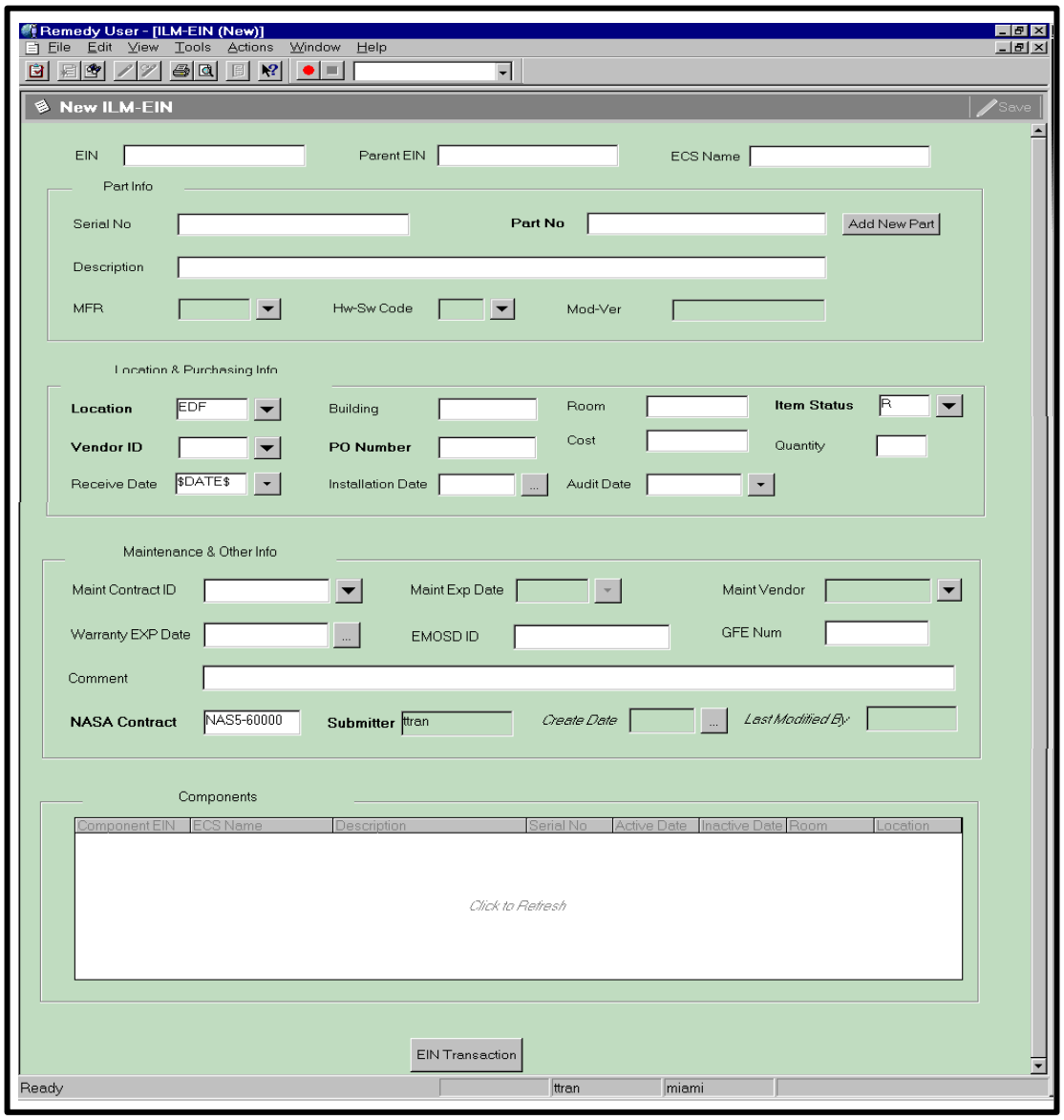

Figure 20. New ILM-EIN Entry Form

Once assigned an EIN, an item is tracked by ILM, with all movement and status recorded throughout its life. The ILM-EIN form illustrated in Figure 20 also allows the Property Administrator to create and modify EIN structures (i.e., Parent-Child relationships) by specifying a Parent EIN. The ILM system also provides reports for hard copy requirements. For some of the data fields on the ILM-EIN form, entries may be displayed from the database if appropriate data entries have been made and saved using other forms. For example, data on component parts are entered using the ILM-OEM Parts form illustrated in Figure 21.

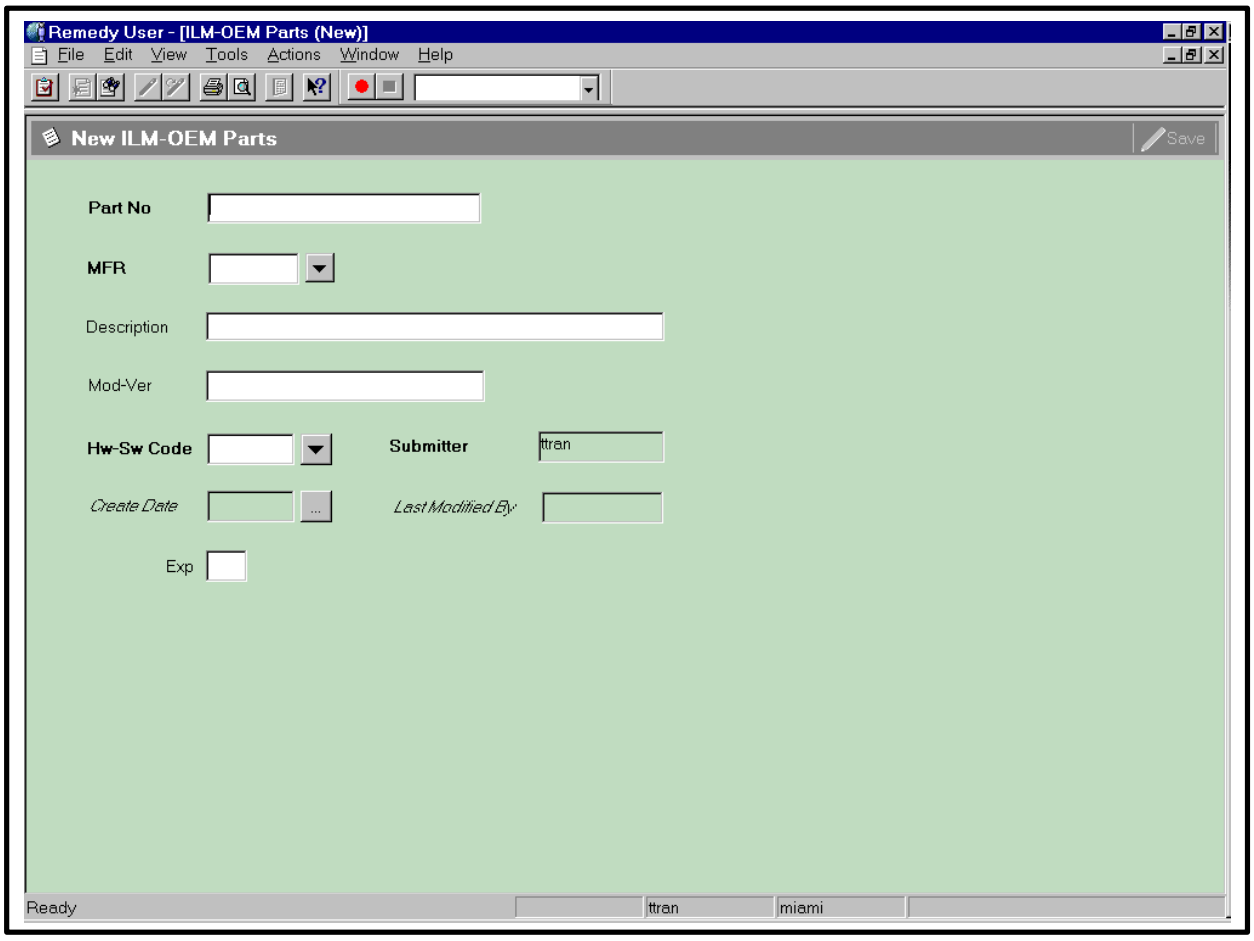

Figure 21. ILM-OEM Parts Form

The ILM tool provides for interaction among some of the forms. For example, a click on the **EIN Transaction** button at the bottom of the form illustrated in Figure 20 results in the display of the **ILM-EIN Transaction** form shown in Figure 22.

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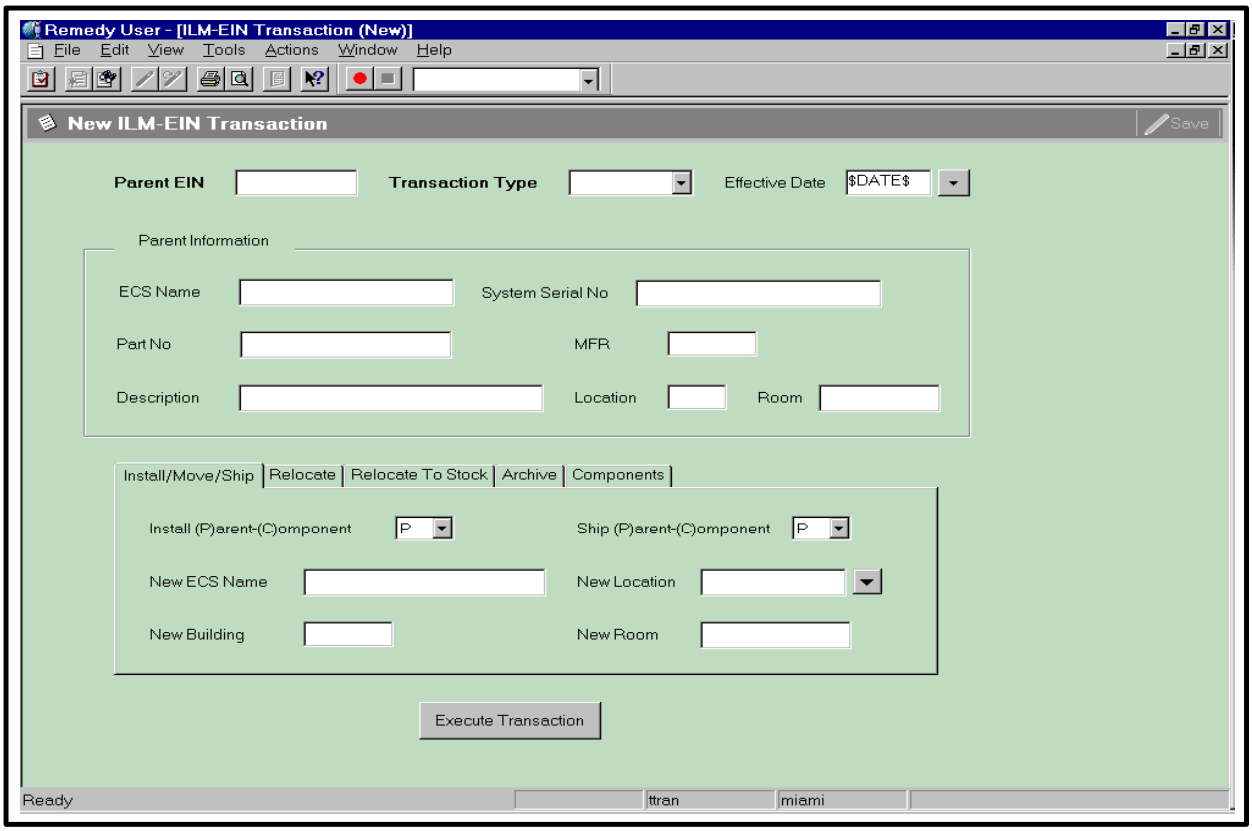

Figure 22. ILM-EIN Transaction Form

To understand the use of the ILM software, consider as an example the arrival at your site of a new RAID (Redundant Array of Inexpensive Disks) unit as an upgrade to the science processor. To update the ILM record for our example, use the following procedure.

Update the Inventory/Logistical Management Record using the ILM Tool

1 Execute the aruser.exe application in the Windows environment (e.g., double click on the **aruser.exe** listing in a Windows Explorer window, or click on the **Start** button in the Windows taskbar and then click on the **Run . . .** option to open the **Run** dialog, from which you then enter the path for the **aruser.exe** application. A typical path is **c:\Program Files\Remedy\aruser.exe**, which may be entered or selected by clicking on the **Browse** button and navigating to the path. When the path is displayed in the **Open:** field of the **Run** dialog, click on the **OK** button.).

- A Remedy Action Request System logo window is displayed briefly, followed by a **Login – Remedy User** dialog box with entry fields for ID and password.
- ***Note***: The Remedy User application is also available in the UNIX environment on the MSS host (e.g., **e0mss21**, **g0mss21**, **l0mss21**, **n0mss21**). It is accessible in the path (e.g., **/usr/ecs/<*MODE*>/COTS/remedy/bin**) containing the Remedy command files. The command **aruser &** is used to launch the application.

2 Type your Remedy user ID in the entry field for ID and type your password in the entry field for password.

- The typed user ID is displayed in its field and asterisks are displayed in the password entry field.

3 Click on the **Apply** button.

- The login dialog is dismissed and a Remedy Action Request System logo window is displayed briefly, followed by a Remedy initial screen from which a number of ECS application forms may be launched.

4 Follow menu path **File→Open** or click on the leftmost button near the top of the window.

- The **Open** dialog box is displayed, showing choices including **ILM-EIN**.

5 Click on **ILM-EIN** to highlight it and then click on the **New** button.

- The **New ILM-EIN** form is displayed.

6 Click in the **EIN** field.

- The cursor is displayed in the field.

7 The **EIN** field is for the Equipment Identification Number from the silver identification tag attached to a hardware item (in our example, a RAID unit). For this exercise, type **0000TTTT** or a number supplied by the instructor as the EIN.

- If the item were an item with no physical tag number (e.g., a software item), you could skip entering an EIN and let the system generate a number at the time the record is saved.
- The typed **EIN** is displayed in the entry field.

8 Click in the **Serial No** field.

- The cursor is displayed in the field.

9 For this exercise, type **S99999**.

- The **Serial Number** is displayed in the entry field.

10 Click in the **Part No** field.

- The cursor is displayed in the field.

11 Type the part number for the new item.

- The typed entry is displayed in the field.

12 If data on the part has been previously entered using the **ILM-OEM Parts** form, go to Step 22; otherwise continue with Step 13.

13 To add data on a new part, click on the **Add New Part** button for access to the **ILM-OEM Parts** form.

- The **ILM-OEM Parts** form is displayed, with the **Part No** field showing the part number that was entered in Step 11.

14 Click on the pull-down arrow at the end of the **MFR** field and select the code for the manufacturer of the part.

- The selected code is displayed in the field.

15 Click in the **Description** field.

- The cursor is displayed in the field.

16 Type a brief manufacturer's or vendor's description of the part (up to 60 characters).

- The typed entry is displayed in the field.

17 Click in the **Mod-Ver** field.

- The cursor is displayed in the field.

18 Type the model or version of the item (up to 24 characters).

- The typed entry is displayed in the field.

19 Click on the pull-down arrow at the end of the **Hw-Sw Code** field and select the code for the class of maintenance costs associated with the item.

- The selected code is displayed in the field.

20 Click on the **Save** button near the upper right corner of the window (or follow menu path **Actions→Save**) to save the information on the part to the database.

- The system supplies entries for the **Submitter**, **Create Date**, and date **Last Modified**.
- The data on the part are save to the database.

21 Follow menu path **File→Close** or click on the Close (**x**) button in the upper right corner of the **ILM-OEM Parts** form.

- The **ILM-OEM Parts** form and window is closed.
- On the **New ILM-EIN** form, data on the part are displayed in the **Description**, **MFR**, **Hw-Sw Code**, and **Mod-Ver** fields.

22 Click on the **EIN Transaction** button at the bottom of the GUI.

- The **ILM-EIN Transaction** form is displayed.

23 Click in the **Parent EIN** field.

- The cursor is displayed in the field.

24 Type the EIN of the Parent item and then press the **Return/Enter** key.

- The typed entry is displayed in the field and associated values from the database are displayed in the **ECS Name**, **System Serial No**, **Part No**, **MFR**, **Description**, **Location**, and **Room** fields.

25 Click on the pull-down arrow at the end of the **Transaction Type** field and select the type of transaction being recorded (for our example in this exercise, select **Installation**).

- The selected entry is displayed in the **Transaction Type** field.

26 If the default current date displayed in the **Effective Date** field is to be the date on which the change is effective, go to Step 29; otherwise continue with Step 27.

27 If it is desired to specify for the change an effective date other than the default current date, click at the end of the **Effective Date** field.

- The cursor is displayed in the field.

28 Clear the displayed date information by backspacing, or drag the cursor to highlight the displayed date; then type the desired date (using format mm/dd/yy) to specify the date on which the change is to be effective.

- An alternative method to enter the information is to click on the pull-down button at the right of the field and use the displayed calendar tool to select the desired date information.

- The entered information is displayed in the **Effective Date** field.

29 Click on the pull-down arrow at the end of the **Install (P)arent-(C)omponent** field and select **C** to designate that it is a component that is being installed.

- The selected choice is displayed in the field.

30 Click on the **Components** tab.

- The GUI displays the **Components** tab field on the **ILM-EIN Transaction** fomr. The field is a table listing the components of the Parent EIN, showing for each its component EIN, description, serial number, process, location, and room.

31 In the list, locate the component to be installed, scrolling down the list if necessary, and double click on the **Component EIN**.

- The **Search ILM-Process Component** form is displayed.

32 Click on the pull-down arrow at the end of the **Process** field of the **Search ILM-Process Component** form and select Y (for Yes).

- The selected entry is displayed in the field.

33 Click on the **Save** button near the upper right corner of the form (or follow menu path **Actions→Save**) to save the component processing data to the database.

- The line item data are saved to the database.
- The **Search ILM-Process Component** form permits the operator to select another component EIN from a list at the top of the form and to process that component in the same way by repeating steps 32 and 33.
- The **Search ILM-Process Component** form may be closed when the component processing is complete.

34 At the bottom of the **ILM-EIN Transaction** form, click on the **Execute Transaction** button.

- The database is updated for the specified component EIN being installed, setting the records to reflect the following:
  - **ECS Name = New ECS Name**.
  - **Location = New Location**.
  - **Building = New Building**.
  - **Room = New Room**.
  - **Item Status = I**.
  - **Installation Date = Effective Date**.
  - **Audit Date = Effective Date**.
- Remedy also writes an "INS" record in the transaction log to capture details of the event, including date/time, initiating operator, and changes to ECS Name and Location values.

35 To exit Remedy, follow menu path **File→Exit**.

- A confirmation dialog is displayed, permitting confirmation to close the application.

Practical Exercise

Introduction

This exercise is designed to practice key elements of the Configuration Management procedures. Perform the tasks identified in the exercise.

Equipment and Materials

One ECS workstation.

Mission Operation Procedures for the ECS Project, 611-CD-610.

Custom Software Problem

This exercise involves a problem with custom software developed for ECS and maintained by the SEO.

A science user trying to use one of the ECS toolkits experiences an inability to get the desired results when using the toolkit with another ECS application. The science user reports the problem to the site's User Services Desk. The User Services Desk records the information and opens a Trouble Ticket (TT) in the TTS. The TT is routed to the site Sustaining Engineer(s) for diagnosis. The Sustaining Engineer verifies that the toolkit's interface to the other ECS application does not provide the desired results and identifies two sources of error: a) the user is attempting a procedure that has not typically been supported at this site and that requires a display hardware upgrade, and b) there are source statements in the software that are in error. The engineer estimates that it will take one person-month to correct and test the application.

1. Generate a CCR for the display hardware upgrade from a Wyse Model WY-150 monochrome display monitor to a Silicon Graphics Model GDM-20D11 Color Graphic Display.
2. Generate a CCR for the software change.
3. Generate a CCR to document the hardware and software changes.
4. Prepare distribution lists for review of the proposed changes.
5. Log in the new software file using the Baseline Manager.
6. Use the Configuration Registry GUI to review the configuration parameters associated with the software.
7. Perform the required Change Control Accounting for the software and hardware changes.
8. Assume delivery of the new display monitor and create updates to the Inventory/Logistical Management records using the ILM tool.

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Slide Presentation

Slide Presentation Description

The following slide presentation represents the slides used by the instructor during the conduct of this lesson.

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