622-CD-001-005

EOSDIS Core System Project

Training Plan for the ECS Project

Revision 3

July 1997

Hughes Information Technology System
Upper Marlboro, Maryland

Training Plan
for the ECS Project

July 1997

Prepared Under Contract NAS5-6000
CDRL Item #128

SUBMITTED BY

Paul Fingerman /s/ 7/31/97

Paul Fingerman, ECS CCB Chairman Date
EOSDIS Core System Project

Hughes Information Technology System
Upper Marlboro, Maryland

622-CD-001-005

Revision 3

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Preface

This document is a contract deliverable with an approval code of 2. As such, it does not require formal Government approval, however, the Government reserves the right to request changes within 45 days of the initial submittal. Future changes to this document shall be made by document change notice (DCN) or by complete revision.

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Abstract

This ECS Training Plan (DID 622/OP2) addresses the development and implementation of the training program for Release B.0. It also provides direction on general processes and policies of the training program. The training addressed in this plan is related to the specific system design, components and operation of Release B.0 and does not include training on management and personal development.

***Keywords**:* training, certification, instructional design, train-the-trainer, courseware, just-in-time, OJT

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Change Information Page

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6-1 through 6-2	Revision 3
AB-1 and AB-2	Revision 3

Document History

Document Number	Status/Issue	Publication Date	CCR Number
622-CD-001-001	Final	December 1994	94-0151
622-CD-001-002	Revision 1	November 1995	95-0786
622-CD-001-003	Revision 2	July 1996	96-0601
622-CD-001-004	Revision 2	October 1996	96-1209
622-CD-001-005	Revision 3	July 1997	97-1080

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Abbreviations and Acronyms

1. Introduction

1.1 Identification

The ECS Training Plan, Contract Data Requirements List (CDRL) Item 128, whose requirements are specified in Data Item Description (DID) 622/OP2, is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS) Contract (NAS5-6000).

1.2 Scope

This training plan is an update of the plan submitted for the Release A Consent To Ship Review (CSR). This plan defines training requirements as they relate to the operations and maintenance of Release B.0. The scope of this plan includes direction on general processes and policies of the Release B.0 training program and is limited to the Release B.0 software and hardware design. Training on management and personal development is not included in this document.

This document is to be used by all members of the ECS Contractor Team.

This document reflects the February 1997 Technical Baseline maintained by the contractor Configuration Control Board (CCB) in accordance with CDRL 224-CD-001-001, dated February 28, 1997.

1.3 Purpose

This plan describes the responsibilities and processes for preparing and executing ECS staff training to maintain and operate the ECS Release B.0 system and to satisfactorily accomplish the following missions:

- AM-1 SSI&T.
- Landsat-7 SSI&T.
- Meteor 3M-1(SAGE III SSI&T).
- Science data processing.

In addition, the training plan provides direction on gathering training requirements, assessing the needs of the training population, determining training sources, developing training courseware, delivering and evaluating the training program, and certifying designated personnel.

1.4 Status and Schedule

This plan provides detailed information about the training program for Release B.0. A revision of this document will be submitted three months prior to the Release B.1 CSR and will address the training requirements and detail for Release B.1. Subsequent revisions will be submitted to address Releases C and D.

1.5 Organization

This document is organized as follows:

Section 1: Introduction—This section presents the document identification, scope, purpose, status and schedule, and organization.

Section 2: Related Documentation—This section identifies parent, applicable and information documents associated with this plan.

Section 3: Training Program Management—This section describes the processes and procedures that will be used to implement the training program.

Section 4: Training Population—This section describes the total population that the ECS training program will address.

Section 5: Release B.0 Training Program—This section describes the requirements and implementation of training for Release B.0.

Section 6: Release B.0 Training Development & Implementation Schedule—This section describes the training and certification events associated with Release B.0.

2. Related Documentation

2.1 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

2.2 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)

2.3 Information Documents

2.3.1 Information Documents Referenced

The following document is referenced herein and, amplifies or clarifies the information presented in this document. This document is not binding on the content of the ECS Training Material.

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

2.3.2 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.

220-TP-001-001	Operations Scenarios - ECS Release B.0 Impacts
305-CD-020-002	Release B SDPS/CSMS System Design Specification Overview for the ECS Project

305-CD-021-002	Release B SDPS Client Subsystem Design Specification for the ECS Project
305-CD-022-002	Release B SDPS Interoperability Subsystem Design Specification for the ECS Project
305-CD-023-002	Release B SDPS Data Management Subsystem Design Specification for the ECS Project
305-CD-024-002	Release B SDPS Data Server Subsystem Design Specification for the ECS Project
305-CD-025-002	Release B SDPS Ingest Subsystem Design Specification [for the ECS Project]
305-CD-026-002	Release B SDPS Planning Subsystem Design Specification for the ECS Project
305-CD-027-002	Release B SDPS Data Processing Subsystem Design Specification for the ECS Project
305-CD-028-002	Release B CSMS Communications Subsystem Design Specification for the ECS Project
305-CD-029-002	Release B CSMS System Management Subsystem Design Specification for the ECS Project
305-CD-030-002	Release B GSFC DAAC Design Specification for the ECS Project
305-CD-031-002	Release B Langley DAAC Design Specification for the ECS Project
305-CD-033-002	Release B EDC DAAC Design Specification for the ECS Project
305-CD-034-002	Release B ASF DAAC Design Specification for the ECS Project
305-CD-035-002	Release B NSIDC DAAC Design Specification for the ECS Project
305-CD-036-002	Release B JPL PO.DAAC Design Specification for the ECS Project
305-CD-037-002	Release B ORNL DAAC Design Specification for the ECS Project
305-CD-038-002	Release B System Monitoring and Coordination Center Design Specification for the ECS Project
305-CD-039-002	Release B Data Dictionary Subsystem Design Specification for the ECS Project
601-CD-001-004	Maintenance and Operations Management Plan for the ECS Project
604-CD-001-004	Operations Concept for the ECS Project: Part 1-- ECS Overview
604-CD-002-003	Operations Concept for the ECS Project: Part 2B -- ECS Release B
605-CD-002-001	Release B SDPS/CSMS Operations Scenarios for the ECS Project
607-CD-001-002	ECS Maintenance and Operations Position Descriptions
500-1002	Goddard Space Flight Center, Network and Mission Operations Support (NMOS) Certification Program, 1/90

3. Training Program Management

This section identifies the policies, processes and procedures of the ECS training program and provides general training management information applicable for the life of the contract.

The training program addresses the training of certified and non-certified ECS maintenance and operations (M&O) personnel. A certified position is a position that includes performance of any system-critical operations or maintenance task. Non-certified positions are all other ECS maintenance and operations (M&O) positions, investigators and investigator support personnel, Distributed Active Archive Center (DAAC) M&O staff not involved in the maintenance and operation of ECS, National Aeronautics and Space Administration (NASA) management and technical personnel and independent verification & validation (IV&V) contractor personnel.

The ECS training program is based on the following principles:

- M&O training will be designed or selected to ensure that operations and maintenance personnel can effectively maintain and operate the ECS system and meet the certification standards specified in the M&O Certification Plan (DID 626).
- User training will be designed or selected to meet needs determined from analyses of user populations by the ECS Science Office.
- The training program will employ the lowest cost training options that satisfy performance and certification needs.
- Training will be scheduled "just-in-time" to achieve maximum retention of knowledge for application on the job.

3.1 Responsibilities/Organizational Interfaces

The ECS training program will be centrally managed by the ECS M&O organization. The ECS Quality Office (QO), System Management Office (SMO), Science and Communications Development Office (SCDO), COTS Purchasing office, and DAAC management have responsibilities associated with the ECS training program. These responsibilities are depicted in Table 3-1.

Table 3-1. Training Responsibilities by Organization

Organization	Responsibilities Related to Training
M&O	• Provide the SEO ECS Operations Trainer, instructional designers and technical trainers to fulfill functions described in Section 3.2.1 and 3.2.3.
SMO	• Support development of training courses.
SCDO	• Support ECS Training Plan development. • Support M&O in identifying training requirements on system components and system design. • Provide subject matter experts (SME) and support the development of training materials related to design and system applications and components. • Provide SMEs to assist in train-the-trainer (T^3) programs.
COTS Purchasing Office	• Procure COTS training. • Identify training credits offered by vendors.
QO	• Monitor and audit ECS training program compliance with: - ECS Training Plan (DID 622). - Training Material (DID 625). - M&O Certification Plan (DID 626). - Performance Assurance Requirements (PAR). - Statement of Work (SOW).
Science Data Engineering	• Identify ECS user training requirements. • Provide training to ECS users.
DAACs	• Provide a DAAC training coordinator (Operations Readiness and Performance Assurance (ORPA) Analyst) to fulfill responsibilities outlined in Section 3.2.2. • Provide site logistics training support (classrooms, equipment, supplies, etc.).

3.2 SEO Training Organization

The ECS training organization consists of elements of the M&O and DAAC ECS operations staff. Figure 3-1 below depicts this organization.

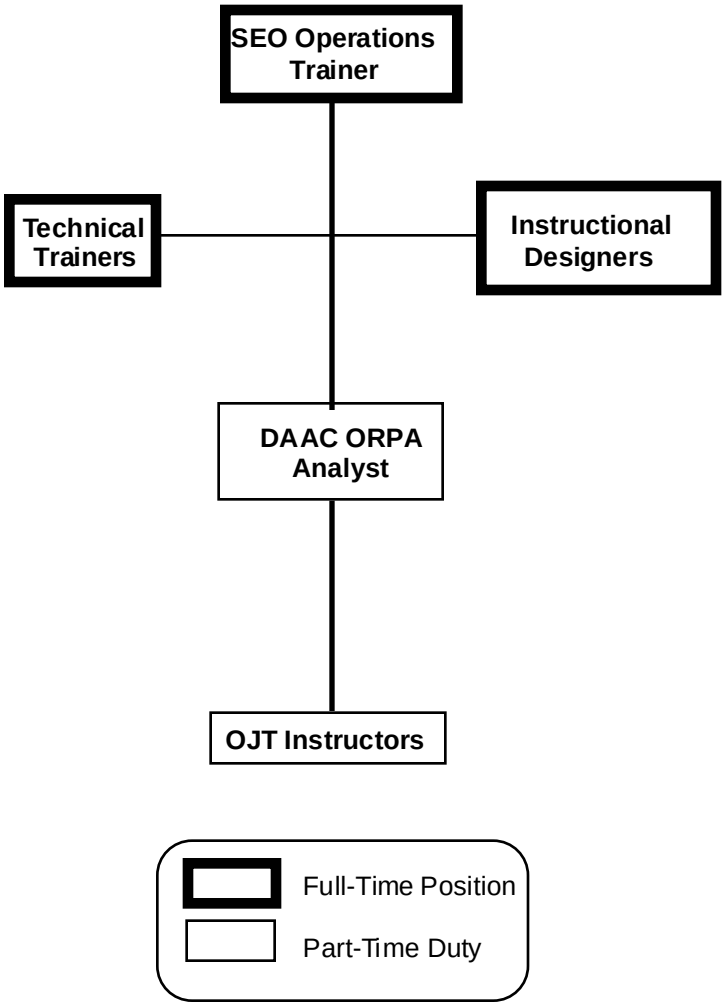

Figure 3-1. ECS Training Organization

3.2.1 SEO Operations Trainer

The SEO Operations Trainer is responsible for the management of the ECS training program. Responsibilities for this position include the following:

- Develop certification skills documentation and plan.
- Implement and manage operator certification as defined in the certification plan.
- Develop curriculum.
- Interface with system development and operations engineers to obtain technical information.
- Schedule training courses.
- Conduct scheduled training courses.
- Supervise the training staff (three to four full-time instructors).
- Coordinate all training activities with the DAAC ORPA analysts and SMC management.
- Manage COTS training.

3.2.2 DAAC Operations Readiness and Performance Assurance (ORPA) Analyst

The DAAC ECS operations staff includes one Operations Readiness and Performance Assurance (ORPA) Analyst responsible for coordinating the training program at the DAAC site with the SEO Operations Trainer. The training coordination responsibilities of the DAAC ORPA Analyst include the following:

- Specifying training requirements for all DAAC ECS operations personnel based on identified training and certification requirements.
- Identifying OJT instructors on the DAAC ECS operations staff and providing them with OJT materials from the SEO ECS training organization.
- Coordinating training classes to be held on site, including arranging classroom space, materials and training equipment; coordinating the use of training equipment consistent with operational requirements, and compiling class rosters.
- Entering and maintaining training and certification records for DAAC ECS operations personnel.
- Providing student evaluations of training to the SEO ECS Operations Trainer.
- Providing any recommendations from DAAC management for improvements in the training program.

3.2.3 Instructional Designers/Trainers

The ECS training organization will include four instructional designers/trainers. Their responsibilities are the following:

- Identify training requirements for instructing ECS M&O functions.
- Develop training materials using instructional system design processes by NASA standards.
- Develop lists of certification criteria (see Section 3.3.1.1) for operations and hardware maintenance positions as defined by the Certification Plan (DID 626).
- Develop course evaluations.
- Develop training and certification tests.
- Assist the SEO Operations Trainer in writing training plans.
- Provide technical instruction.
- Training and certifying OJT instructors (see Section 3.3.1.6.1).

3.2.4 OJT Instructors

OJT instructor positions are part-time duties assigned to qualified individuals on the SMC or DAAC ECS operations staff. These individuals are temporarily pulled from the existing operations staff and provide their expertise to instruct/monitor new staff personnel. The OJT staff members are considered to be subject matter experts capable of one-on-one assistance to a student, using instructions and materials provided by the ECS training organization.

3.3 Training Program Development

The development of the ECS training program includes addressing the training needs related to certified and non-certified training populations.

3.3.1 Training & Certification Development Process

Key ECS operations and maintenance personnel will be certified prior to operational assignment. Selection of the positions requiring certification will be finalized and clearly defined in the Certification Plan (CDRL 626). Certification is the verification through written, oral and/or performance evaluation, that an individual meets the minimum level of proficiency necessary to perform the duties associated with a system, subsystem or position. Most personnel will require some training to meet the certification requirement. The training program for these personnel is designed to satisfy the certification requirement.

Figure 3-2 depicts the relationships between system design, certification and training. These relationships are described in subsequent sub-sections.

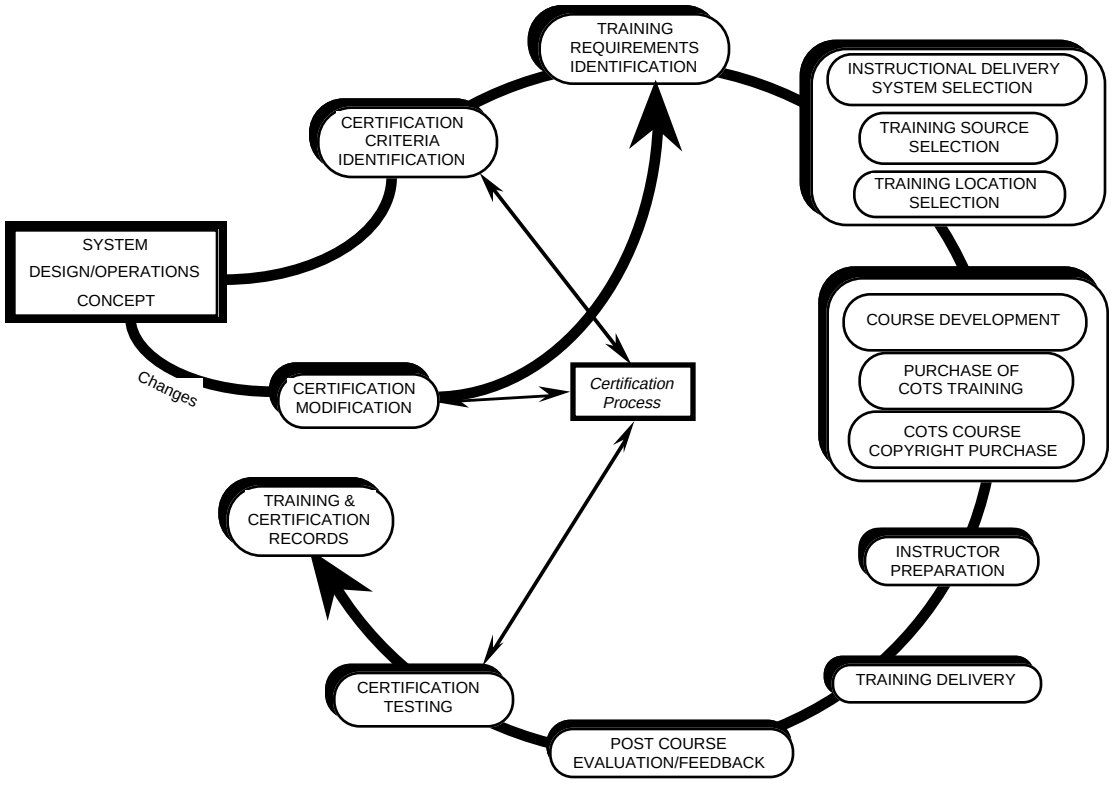

Figure 3-2. M&O Training and Certification Design Process

The certification process is an important component of the M&O training process. The steps of the certification process are depicted in Figure 3-3.

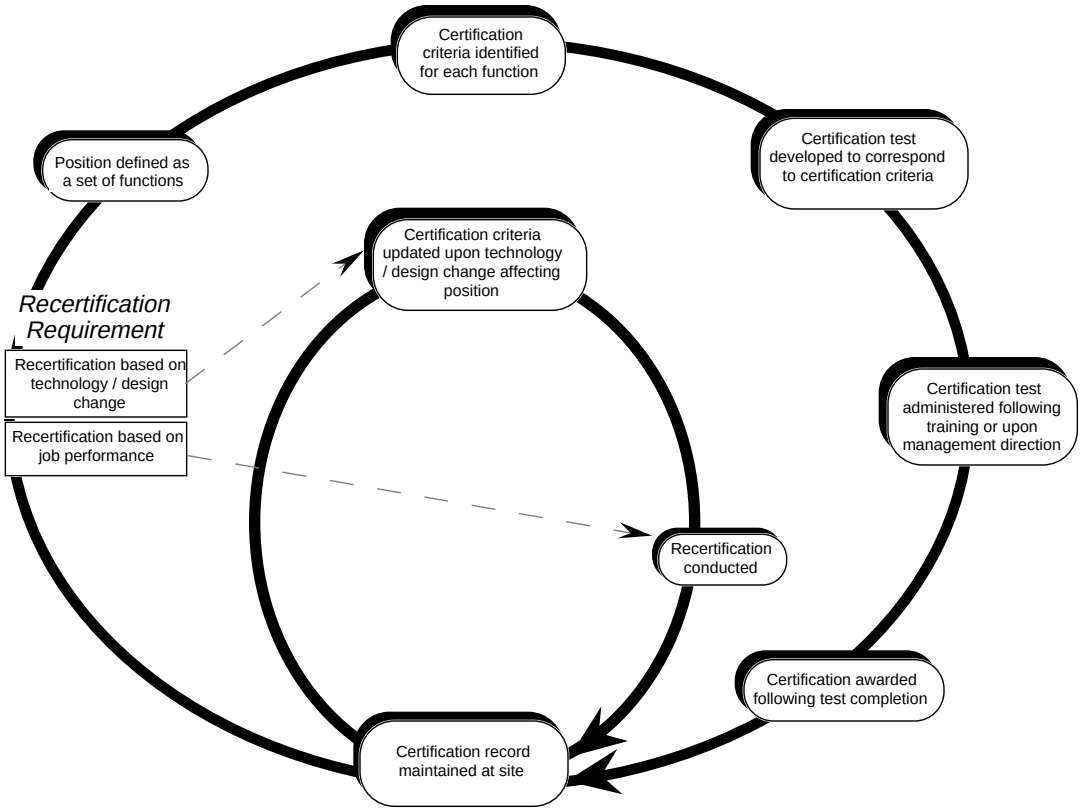

Figure 3-3. M&O Certification Process

3.3.1.1 Certification Criteria Identification

Certification criteria are the skills and knowledge required to reach minimum acceptable performance standards. All training and testing will be based on the certification criteria.

Detailed descriptions of operations and maintenance functions serve as the basis for identifying certification criteria. Each M&O function will have a list of associated certification criteria. An M&O position will have at least one of these lists, but in cases where a position encompasses more than one function, additional lists will be developed.

3.3.1.2 M&O Training Requirements Identification

For certain operator positions on the ECS operations staff (see Section 5.4), key tasks will be identified as system-critical and will be included in the course training requirements as well as defined in the Certification Plan (CDRL 626). For personnel in support positions, training requirements will be determined based on job descriptions and the characteristics of the design (i.e. specific subsystem functions and system components related to the position).

3.3.1.2.1 Defining Training Objectives

Once the key ECS tasks have been selected, lesson objectives will be developed. Each lesson objective will consist of an action, condition and standard and will be used to develop the training course material. Common objectives will be grouped by subject into modular lessons which will be taught to appropriately selected operators.

3.3.1.2.2 Recommended Training Path to Certification

Using the certification criteria and the training requirements identified, a recommended training path to certification will be created for each ECS operations and maintenance position requiring certification. This path will list the courses/lessons recommended to provide the skills necessary to become certified. Not all the lessons on the list will be required for everyone; for instance, an experienced system administrator may not require any training to pass the certification test, while another may require several courses. The recommended path is intended to assist managers in determining training solutions on an individual basis.

3.3.1.3 Selection of Instructional Delivery Systems

Once training requirements have been determined and objectives defined, an instructional delivery system will be chosen to best meet the requirement for the training audience. The primary instructional delivery systems are classroom training (CR), COTS provided computer-based training (CBT) and OJT. Figure 3-4 depicts the procedure for selecting instructional delivery systems.

3.3.1.3.1 CR Training

CR training may be provided by COTS equipment vendors or developed by the project. This training type will be selected in cases where it is determined that the classroom environment is the most effective medium for learning; the costs associated with such training over time are beneficial; and it is logistically feasible to assemble students and equipment in a single training location.

Project-developed CR training will be designed in accordance with section 3.1 of the Contractor Provided Training Specification. Training materials will generally include the following, although some items may be consolidated:

- Classroom Objectives
- Student Guide
- Reference Documents
- Positional Console Training Tools
- Operational Procedures
- Practical Exercises

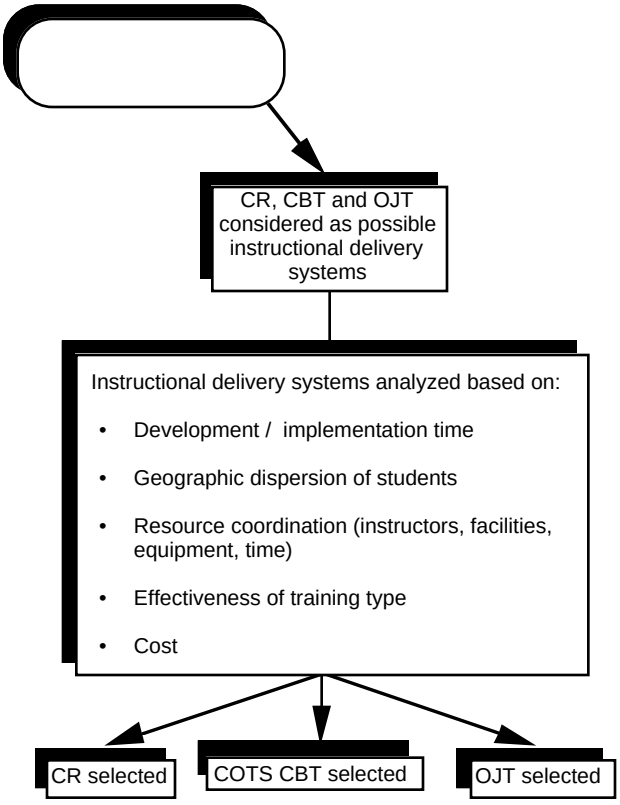

Figure 3-4. Instructional Delivery System Selection Process

3.3.1.3.2 OJT

In OJT, the student acquires job skill proficiency under actual job conditions, while tutored by an expert in the organization. The expert, or "OJT instructor" is selected based on demonstrated knowledge and skill in the subject matter, and on instructional ability. Remedial instruction will be performed on an as needed basis by the site expert. The site expert can use the following materials derived from CDRL 625 Training Materials:

- Objectives
- Student Guide
- Reference Documents
- Positional Console Training Tools
- Operational Procedures
- Practical Exercises
- Evaluation and recording requirements

Figure 3-5 depicts the OJT process.

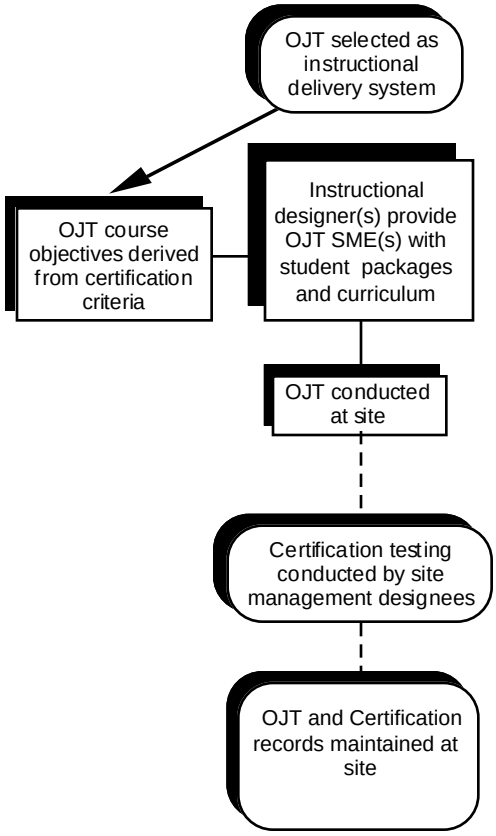

Figure 3-5. OJT Process

3.3.1.3.3 CBT

CBT may be selected when provided by COTS vendors. This training type will be used in cases where existing COTS training packages have determined that the hands-on experience and costs associated with such training over time are more efficient and beneficial than providing CR instruction. COTS CBT provided by the vendor will be performed at the vendors facilities and as such will not require ECS equipment/resources.

3.3.1.4 Training Source Selection

To satisfy a training requirement, the ECS training program can rely on several sources. An ECS training library (located at the SMC) will be developed, which will contain course materials from courses that have been developed by the project or purchased from COTS vendors. Training may be procured from COTS vendors for individuals or groups, and arranged on-site or at the vendor's site. Training materials may be developed by the project internally to satisfy a requirement; this is particularly relevant in cases where the training requirements are specific to the ECS system or to project-developed components of the system. Figure 3-6 depicts the decision factors involved in determining the source for satisfying a training requirement.

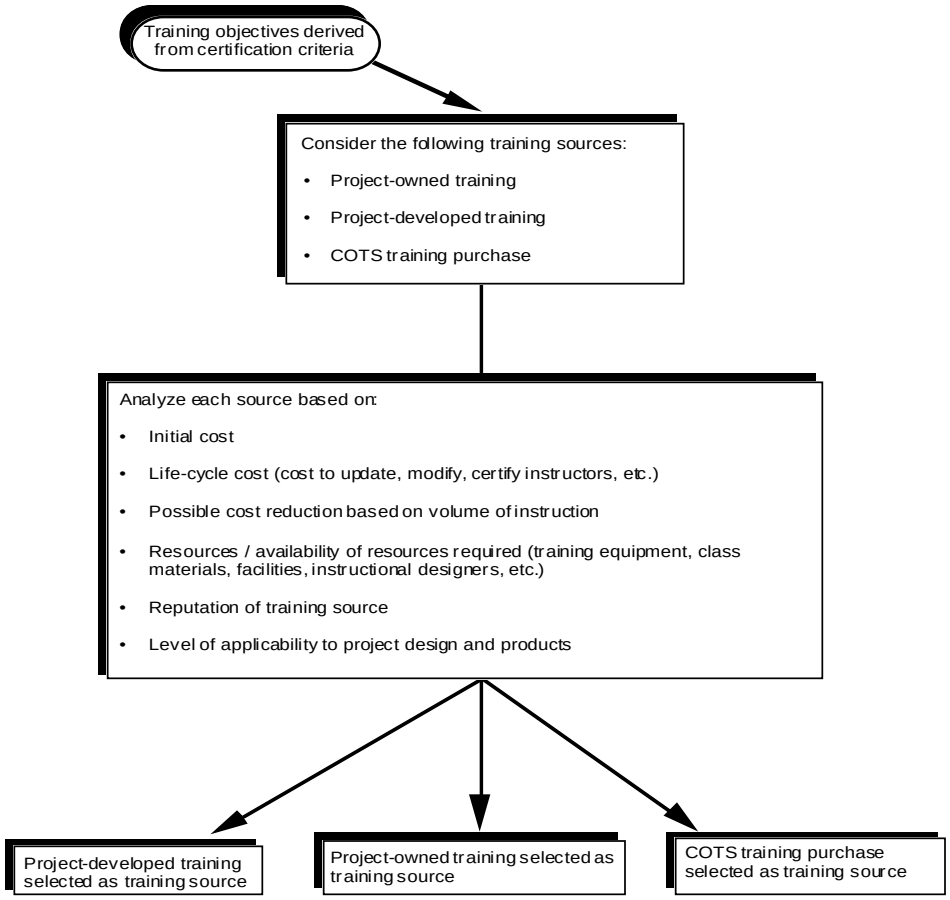

Figure 3-6. Training Source Selection Process

3.3.1.4.1 Course Development

Most of the operation training will be project-developed. While COTS software is extensively used on ECS, integrating COTS software into ECS has required custom software to be developed in order to bridge the gap to the COTS world. Training on the system and project-developed applications, toolkits and applications program interfaces (API) will be developed with project resources. Figure 3-7 depicts the course development process. The materials developed are subject to inspection by NASA.

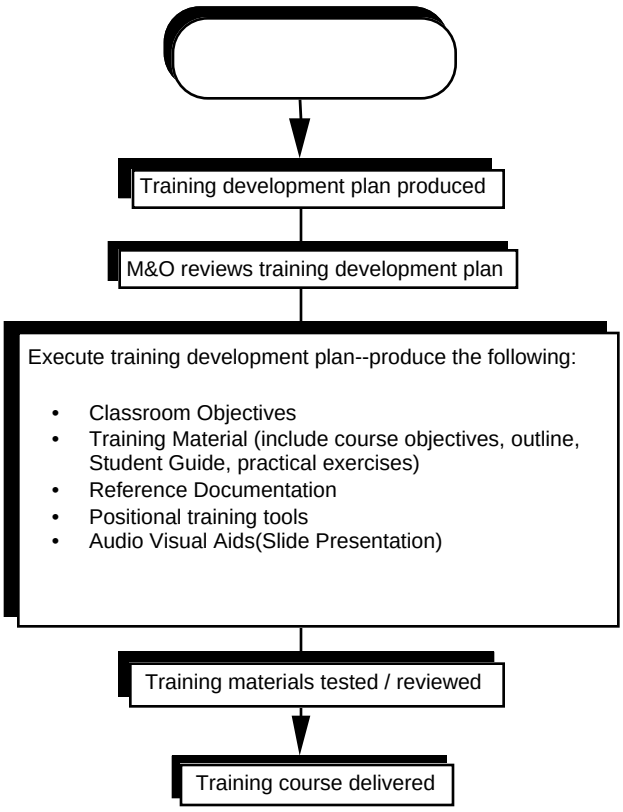

Figure 3-7. Course Development Process

3.3.1.4.2 Selection of COTS Training

COTS training courses are chosen based on the organization's need for an in depth knowledge of a particular commercial software package. In depth knowledge would include tasks requiring installation, configuration or nice to know information not typically required to use the software package. In most cases, site expertise for commercial software will be limited to the administrative and/or engineering staff. The administrative/engineering staff will serve as a focal point to distribute/assist/train the operator community when required. The procedure for purchasing COTS training is depicted in Figure 3-8.

3.3.1.4.3 Purchase of Unlimited Use Rights to COTS Courses

The repetitive use of a COTS course may justify the purchase of unlimited use rights. Any decision to purchase these rights will include consideration of the right to modify if necessary, and the cost of buying updates to course material if required. The purchase of unlimited use rights will follow the same approval and procurement process as depicted in Figure 3-8.

3.3.1.4.4 COTS Training Credits Distribution

Vendor training credits are managed by the SEO ECS Operations Trainer as a part of the COTS training budget. Credits will be used to purchase vendor training for M&O personnel related specifically to M&O functions; excess credits will be distributed to DAAC management and technical personnel, and NASA management and technical personnel.

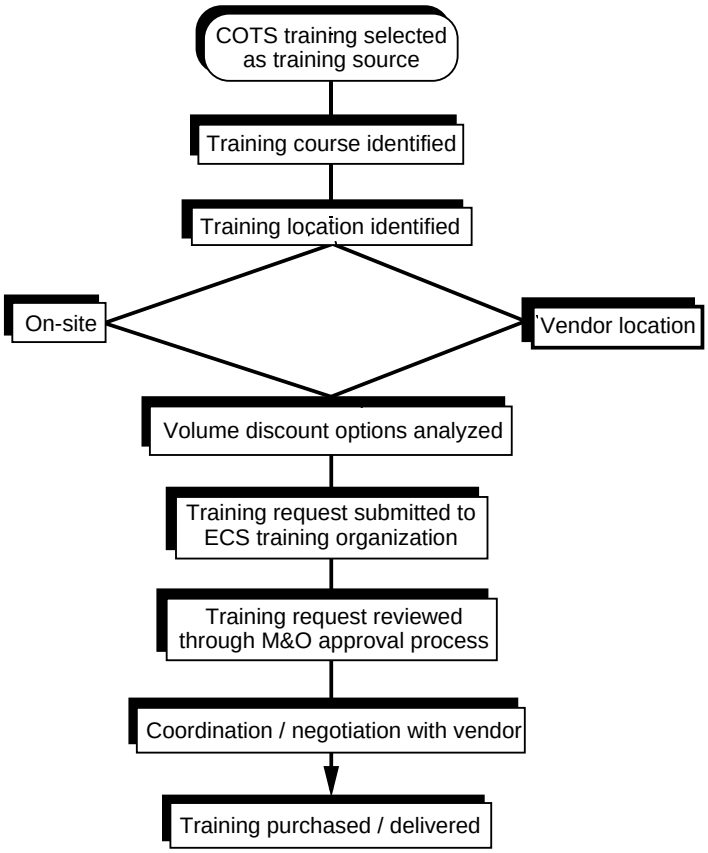

Figure 3-8. COTS Course Purchase Approval Process

3.3.1.5 Facility Requirements

Training locations are selected based on the factors depicted in Figure 3-9. The ECS training program may require the availability of two classrooms at each site or in the vicinity of the site for M&O training. Classroom spaces will be chosen to meet the following requirements:

- Adequate lighting for students (50 lumens per square foot at eye level recommended).
- Table space for each student to be able to use charts of at least 11"X17" in size.
- Space per student necessary to provide a comfortable learning environment, and to comply with local, state and federal fire and safety regulations.
- Standard classroom equipment (i.e., overhead projector, white board, etc.) provided from site training resource pool or other local source.
- Operator interfaces (workstations or X-terminals) linked to the operational system.

Training outside the classroom is also required. Some hands-on technical training will occur on operational systems, since a separate pool of equipment for training does not exist. It is not expected that operations equipment will be relocated for such training.

Training use of equipment will be scheduled to avoid impact to operations. When training space and equipment requirements clash with operational requirements, off-site training will be considered.

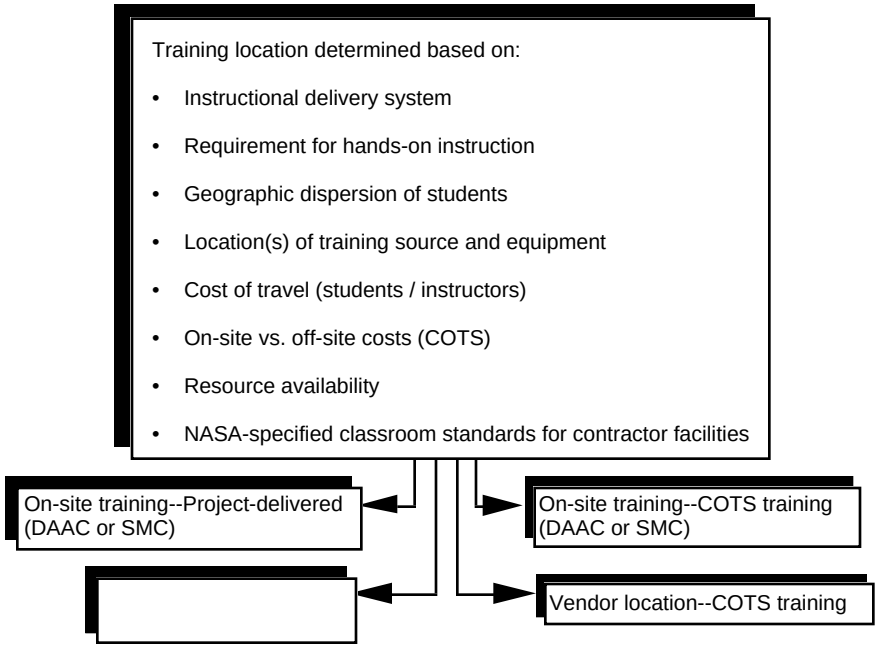

Figure 3-9. Training Location Selection Process

3.3.1.6 Instructor Preparation

Instructors for the Hughes Operation Training Course will be provided by the ECS SEO, or the development organizations. To ensure that the instructors are adequately prepared to instruct, the instructor staff will interface with the ECS development team and will participate in informal design reviews prior to CSR and continuing through to RRR.

All training material will be validated by thoroughly testing all procedural steps on the delivered CSR equipment.

3.3.1.6.1 OJT Instructor Certification

OJT instructors are experienced individuals chosen by site management to perform OJT. OJT programs will generally provide materials for one-on-one or small group training, and will not require formal classroom instruction. Therefore, he certification of OJT instructors will be limited to a brief session(s) between the OJT instructor and a training professional from the ECS SEO training staff to ensure that the OJT instructor understands how to use the materials, conduct and administer the program, record results and conduct any certification testing required.

3.3.1.6.2 CR Instructor Certification

Formal classroom instruction will be conducted by training professionals from the ECS SEO training organization. Prior to teaching in the classroom, the instructors will have validated their training materials and participated in detailed informal design reviews, thus ensuring that they are familiar with the course materials and practical application exercises. Additionally, all SEO instructors will have a minimum of two years experience in classroom instruction.

3.3.1.7 Post Course Evaluation & Feedback

Following the completion of training (project delivered or vendor delivered), students will complete feedback forms which will be archived into ECS. Certification and recertification test results will also be used to evaluate training effectiveness.

3.3.1.8 Certification Testing Policies and Procedures

Certification tests will be developed to test proficiency in functional areas defined by certification criteria. Primary responsibility for developing certification tests belongs to the ECS training organization, however, sites will be required to submit any specific information to the ECS training organization that they feel should be included in the tests. The ECS training organization will provide certification materials to the sites, and the sites will conduct the certification testing in accordance with the M&O Certification Plan (DID 626).

In most cases, the certification test for a functional area will be a series of tests or practical application checklists that will be administered following each training course in the recommended training path to certification. These same tests will be used to determine if M&O personnel are experienced enough to be excused from training on certain topics.

Certification is officially accomplished upon the completion of all certification testing and successful participation the operational readiness exercises at the four DAACs 5-6 months prior to launch of the instruments supported by each DAAC.

3.3.1.9 Recertification

Recertification will be required in the following cases:

- Change in technology or design which changes skills required in a function (i.e. new system release)
- Demonstrated deficiency in executing an assigned function

Management will have the option of recertifying without retesting in cases where an individual has been performing adequately in a function, and there has not been any significant design change impacting job duties.

3.3.1.10 Training & Certification Records

DID 525 requires that training and certification records be maintained by the project and made available for NASA inspection. Local site management will be responsible for maintaining the original records of all training and certification conducted at the site. Consolidated course and certification materials will be made available for NASA inspection at the SMC.

3.3.1.11 Certification Modification

Certification criteria will be modified with each release of the system to reflect changes in functions and responsibilities associated with changes in technology or system design. Criteria may also be modified based on a management decision that current criteria are inadequate.

3.3.1.12 Training Objectives Modification

Training objectives related to a particular function will be modified based on any change in certification criteria. If new training objectives are not covered in the existing recommended training path to certification, then courseware may require modification, or new courseware may need to be purchased or developed.

3.3.2 Training Program Development/Non-Certification Related

Training for non-certifiable positions will be designed to ensure that these individuals receive information necessary to conduct functions required of their positions. Information on which to base training requirements will be derived from various sources, and the testing of these individuals will not be conducted.

3.3.2.1 User Training

User training needs will be addressed by the ECS Science Data Engineering organization. Science Data Engineering will produce on-line tutorials, user guides and quick reference guides

as a part of the Release B.0 systems. DID 205 addresses this deliverable. Science Data Engineering also works closely with DAAC User Services to ensure that user training needs are being met.

3.3.2.2 DAAC M&O Training

DAAC M&O personnel (those not involved with the operation of ECS) may require training at both the user and basic operator levels. For any training requirements, project-conducted training will be offered to these individuals, within budgetary constraints.

3.3.2.3 NASA Management and Technical Personnel Training

NASA management and technical personnel may require training at both the user and basic operator levels. For any training requirements, spaces in project-conducted training will be offered to these individuals, within budgetary constraints.

3.3.2.4 IV&V Personnel Training

IV&V contractor training will consist of overviews of the system and subsystems.

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4. Training Population

The training population is comprised of two broad groups: operator personnel and support personnel. Operator personnel include all ECS M&O personnel at any site with system critical day-to-day operational interfaces or maintenance functions related to the ECS system. Support personnel include ECS M&O personnel who support the ECS operation but do not provide critical day-to-day operational interface with ECS. For detailed descriptions see the Maintenance and Operations Position Descriptions for the ECS Project (DID 607).

Operator personnel include:

- SMC operations staff
- DAAC operations staff

Support personnel include:

- SMC support staff
- DAAC support staff
- Sustaining Engineering Organization (SEO)
- Integrated Logistic Support (ILS) staff
- Investigator & investigator support personnel
- IV&V contractor personnel
- DAAC management and technical personnel (individuals at the DAACs that are not directly involved in the operation of ECS)
- NASA management and technical personnel
- Successor contractor personnel

4.1 SMC Operations Staff

The SMC operations staff includes the following positions:

- Computer Operator
- SMC/EOC Maintenance Coordinator
- Fault Manager
- Security Controller
- Resource Controller
- System Administrator

4.2 DAAC ECS Operations Staff

The DAAC ECS operations staff positions are listed below (note that at some DAACs, one person may be assigned to two or more of these positions simultaneously):

- Computer Operator
- Production Monitor
- Archive Manager
- Resource Manager
- Maintenance Coordinator
- Production Planner
- Resource Planner
- System Administrator
- Database Administrator
- Ingest/Distribution Technician

4.3 SMC Support Staff

The SMC support personnel include the following:

- Configuration Management Administrator
- Operations Supervisor
- Performance Analyst
- Network Analyst
- ECS User Services Working Group (USWG) Liaison

4.4 DAAC Support Staff

The DAAC ECS personnel include the following (note that at some DAACs, one person may be filling two or more of these roles simultaneously):

- ECS Contractor Manager
- Operations Supervisor
- Administrative Assistant
- Operations Readiness and Performance Assurance Analyst
- System Engineer
- System Test Engineer

- SW Maintenance Engineer
- Science Coordinator
- Configuration Management (CM) Administrator
- Science Software I&T Support Engineer
- Integrated Logistic Support Administrator
- User Services Representative
- Science Data Specialist

4.5 SEO Staff

The following SEO staff positions represent support positions that will require training under this plan. Those positions include:

- ECS M&O Office Manager
- ECS SEO Manager
- Administrative Assistant
- System Administrator
- Operations Readiness & Performance Assurance Analyst
- Librarian
- Configuration Management Administrator
- System Engineer
- Software Maintenance Engineer
- Science Coordinator
- System Test Engineer
- Operations Trainer

4.6 ILS Staff

The following ILS staff positions represent support positions that will require training under this plan. Those positions include:

- ILS Contractor Manager
- ILS Administrator
- ILS Logistic Engineer
- Installation Coordinator
- ECS Property Administrator

4.7 Investigator & Investigator Support Personnel

Investigators & investigator support personnel include principal investigators (PI), their co-PIs and graduate students. Each PI conducts research differently and uses co-PIs and graduate students to support them in various ways. In order to gather the general needs of all PIs, this plan addresses the needs of these categories together, since the work of all three contributes to the overall objectives of the PI.

- Educational background: PIs generally hold advanced degrees and are leaders in their respective areas of research. Their co-PIs and graduate students generally hold advanced degrees as well. They are well versed on a wide variety of the science and technical aspects of ECS, particularly sensors and instruments.
- Number of students per location: This training population will be geographically dispersed; training solutions will be made available on-line.
- Training Needs: The training needs of this population will be addressed by the ECS Science Office with on-line tutorials.

4.8 IV&V Contractor Personnel

The project will provide the ECS-specific training to IV&V contractor personnel necessary to conduct verification and validation tests. These personnel are expected to be experienced with software engineering methodology, software languages, testing methodology and techniques, CASE tools, selected ECS COTS, and UNIX operating systems. Specific training for the IV&V contractor is addressed in Section 5.4.

4.9 DAAC M&O Personnel

DAAC M&O personnel are those individuals at the DAAC that perform M&O functions other than those associated with ECS. These individuals will be offered the opportunity to attend ECS courses and vendor training held on-site or in the vicinity of the DAAC.

4.10 NASA Management and Technical Personnel

NASA management and technical personnel are NASA employees with an interest in the ECS system. These individuals will be offered the opportunity to attend ECS courses at any site and to attend vendor training held on-site or in the vicinity of any site within budgetary constraints.

4.11 Successor Contractor Personnel

Successor contractors include any non-Hughes team organization that assumes operational responsibility for a part of the ECS system at any site. Training will be offered to these contractors to ensure a smooth transition with minimal impact on operations. Specific training courses for successor contractors are addressed in Sections 5.4 and 5.5 for Release B.0.

5. Release B.0 Training Program

5.1 Scope of Release B.0 Training

The Release B.0 training program will provide operation training necessary to operate the Release B.0 system, conduct site operations, and perform functions related to the AM-1, Landsat-7 and Meteor 3M-1 instruments. Limited computer understanding is required in order to attend Release B.0 training. The training program will be based on classroom instruction using developed course curriculum. Classroom instruction will be supplemented by the experience operators gain from supporting the operational readiness exercises. All training material developed for Release B.0 will be used as the curriculum foundation for training required on subsequent releases.

5.2 Release B.0 Training Approach

The Hughes Operation Training Course is grouped into modular lessons based on common task groupings, operational and positional requirements. (See The Training Course Outline (DID 625/OP3) for a detailed description of the course outline). Release B.0 training for M&O personnel will include the following lesson topics:

- Introduction and System Overview - Provides a general overview of the Release B.0 Earth Observing System Data and Information System (EOSDIS) Core System (ECS). Identification of the hardware and software configurations used to support ECS is covered. Additional information includes an overview of all COTS, system security, selected operational scenarios, database, and external interfaces.*

- Problem Management - Provides a detailed description of the different tasks that are required in order to report a problem. The lesson includes a detailed review of the trouble ticket process.*

- System Administration - Provides a detailed description of the different tasks that are required in order to perform system administration of ECS. The lesson includes a detailed review of the initial program loads for all system upgrades, mode management, performing COTS administration, performing system backups and restores, adding/modifying user accounts, assigning access privileges, server startup/shutdown, performing general security features, ESOD administration and workstation installation.*

- Network Administration - Provides a detailed description of the different tasks that are needed in order to monitor the performance of the network. The Network Administration lesson includes a review of the network configuration and topology, network performance monitoring, inter-DAAC network issues and network fault analysis.*

- Production Planning and Processing - Provides a detailed description of the process for creating, modifying, and implementing a production plan for a site, reviewing production rules, manages all planning-related data, monitoring production, checking the quality of the production data, and implementing plans and recovery procedures.*

- Resource Planning - Provides a detailed description of procedures for defining production resources to the planning subsystem, integrating resource requests into a resource plan for a site and scheduling/distributing resources on a daily, weekly and monthly basis.

- Ingest - Provides a detailed description of the process for receiving, logging and marking all hard media for processing and storage in the ECS system. It includes methods for monitoring performance of data requests, managing/processing ingest data, and ingesting hard media/metadata.

- Data Distribution - Provides information to support the operators in distributing data to users on a variety of media. This lesson describes the process for distribution of products to the user community.

- Archive - Reviews the process for archiving data. This lesson includes a description of process for monitoring the performance of ingest/archival/distribution operations, maintaining configuration of peripherals and data servers, documenting archive errors, maintaining archive processing queue (both storing and retrieval), managing archive content and capacity, submitting new data archive requests to the Science Coordinator and providing archive status.

- Database Administration - Provides a functional overview of the ECS databases and detailed description of the tasks required to maintain the database system including the operations interface to perform database administration, product installation and disk storage management, backup and recovery, managing SQL server login accounts and privileges, database tuning and performance monitoring, database security and auditing, database integrity monitoring, and database troubleshooting.*

- Configuration Management - 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 (CCR); 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; generate the Configuration Status Accounting Records (CSAR): manage, enter, maintain and update documents related to the operational baseline.*

- User Services - Provides a detailed description of the different tasks that relate to providing support to the user community. The type of services reviewed in this lesson include user account management, processing an order, canceling an order, fulfilling subscriptions, performing cross-DAAC referral, and cross-DAAC order tracking.

- ↑ Science Software Integration and Test - Provides a detailed description of the process required to acquire an algorithm package, create Earth Science Data Types, check the science software, compile and link the science software, run a PGE in a simulated SCF environment, examine the PGE-produced log files, perform file comparison, update the PDPS database and data server, integrate science software into the EOSDIS environment, test the new science software to verify its operability and advertise the availability of the PGE data using the ESOD.*

- ↑ System Troubleshooting - Provides a detailed description of the different tasks that are required in order to perform system troubleshooting. The lesson includes a detailed review of the system monitoring capabilities, troubleshooting process and trouble ticket set-up and processing.*

- ↑ System Operations - Provides the system operators an opportunity to preview operational readiness exercises. This lesson will consist of reviewing scenarios that depict real situations and will serve to test each operators ability to respond appropriately to the given situation.

*These topics were selected for training on the Pre-release B Testbed and are being updated to reflect the Release B.0 system.

5.2.1 Release B.0 Training Conduct

The Operation Training Course for Release B.0 will be presented to the LaRC, GSFC, EDC and NSIDC DAACs in support of the operational readiness plan. Release B.0 training will consist of two phases. The first phase, also known as Preliminary Training, will consist of a brief theory only lecture covering selected lesson topics. These lectures are intended to provide the operator with a general understanding of the expected functionality of Release B.0. The second phase of training, also known as Classroom Training, will provide hands-on operational training to selected users of the Release B.0 system. This training will include all lessons as defined by the lesson objectives contained in CDRL 625 ECS Training Materials.

Additionally, System Administrators and Engineers will attend selected COTS HW/SW vendor training courses. These courses will be used to supplement the Operation Training Course and to expand the knowledge base of the DAACs and SEO organizations.

Once the formal training has been completed, knowledge reinforcement will be accomplished by the informal experience gained during the performance of the operational readiness exercises.

5.2.2 Additional M&O Training

After the initial Release B.0 training has been completed, additional training may be required to satisfy normal operator certification requirements. The ORPA Analyst may determine that multiple operator positions require certification due to attrition or that new hires have increased the volume of training requirements beyond the capabilities of using the existing staff to conduct informal OJT. In this case, the ORPA Analyst will contact the SEO Operations Trainer who will schedule a training course covering the required lesson modules.

In cases where COTS training is required, the ORPA Analyst will inform the SEO Operations Trainer who will then make vendor recommendations for the COTS Training course and aid the ORPA Analyst in obtaining the required training.

The ECS Science Office will satisfy the user training requirement (see Section 3.3.2.1).

5.3 Description of Performance Goals for Release B.0

There are specific performance goals for each training population. For selected ECS operations and maintenance personnel, attainment of these goals will result in certification. For all other population groups, performance goals are the attainment of the knowledge necessary to effectively conduct functions on the system essential to their positions.

5.4 Release B.0 Training Requirements

The training requirements for Release B.0 are derived from the system design and the operations concept. The lesson topics listed in Tables 5-1 were chosen based on the processes described in Section 3.

Table 5-1 matches the Hughes Operation Training Course lessons to the recommended operator and support personnel for the Release B.0 training population.

Table 5-2 addresses training on COTS system components for the Release B.0 training population. Where as the operations training on the system (Table 5-1) will contain information about the use of some of these components, this table refers to more extensive training on administering and controlling configurable parameters of COTS components.

Table 5-1. Release B.0 Training

SUBJECT	SMC Ops						SMC Support					DAAC ECS Ops										DAAC Support														SEO											ILS					Other		
	Computer Operator	Maintenance Coordinator	Security Controller	Fault Manager	System Administrator	Resource Controller	Configuration Management Administrator	Operations Supervisor	ECS User Services Working Group Liaison	Performance Analyst	Network Analyst	Computer Operator	Production Monitor	Resource Manager	Maintenance Coordinator	Production Planner	Archive Manager	Resource Planner	Database Administrator	Ingest/Distribution Technician	System Administrator	ECS Contractor Manager	Operations Supervisor	Administrative Assistant	ORPA Analyst	System Engineer	System Test Engineer	SW Maintenance Engineer	Science Coordinator	Configuration Management Administrator	Science Software I&T Support Engineer	Integrated Logistics Support Administrator	Science Data Specialist	User Services Representative	ECS M&O Office Manager	ECS SEO Manager	Administrative Assistant	System Administrator	ORPA Analyst	Librarian	Configuration Management Administrator	System Engineer	Software Maintenance Engineer	System Test Engineer	Science Coordinator	Operations Trainer	ILS Contractor Manager	ILS Administrator	ILS Installation Coordinator	ECS Property Administrator	ILS Logistic Engineer	Investigators/Investigator Support	IV &V Contractor	Successor
Introduction and System Overview	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x	x	x							x	x	x
Problem Management	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x	x	x							x	x	x
System Administration					x							x									x					x											x				x												x
Network Administration					x						x			x							x					x											x				x												x
Production Planning and Processing													x			x		x			x					x	x	x	x		x					x					x	x	x	x								x
Resource Planning				x		x							x	x		x		x			x					x	x	x	x		x										x	x	x	x								x
Ingest																	x			x	x					x	x														x	x		x									x
Data Distribution																	x			x	x					x	x	x													x	x	x									x
Archive																	x			x	x					x	x	x													x	x	x									x
Database Administration																			x		x					x	x	x					x								x	x	x									x
Configuration Management							x																					x		x							x			x												x
User Services																					x					x	x	x					x								x	x	x									x
Science Software Integration and Test													x	x		x										x		x			x										x	x										x
System Troubleshooting	x	x		x	x						x	x			x						x					x	x	x				x				x					x	x	x									x
System Operations	x	x		x	x	x	x				x	x	x	x	x	x	x	x	x	x	x		x	x		x	x	x	x	x	x	x				x		x	x	x	x	x									x

Table 5-2. Release B.0 Developed System Components Training

SUBJECT	Training Type	COTS Operator Training - SMC						COTS Support Training - SMC						COTS Operator Training per DAAC										COTS Support Training per DAAC											COTS Training - SEO										ILS						Other		
		Computer Operator	Maintenance Coordinator	Security Controller	Fault Manager	System Administrator	Resource Controller	Configuration Management Administrator	Operations Supervisor	ECS User Services Working Group Liaison	Performance Analyst	Network Analyst		Computer Operator	Production Monitor	Resource Manager	Maintenance Coordinator	Production Planner	Archive Manager	Resource Planner	Database Administrator	Ingest/Distribution Technician	System Administrator		ECS Contractor Manager	Operations Supervisor	Administrative Assistant	DRPA Analyst	System Engineer	System Test Engineer	SW Maintenance Engineer	Science Coordinator	Configuration Management Administrator	Science Software I&T Support Engineer	Integrated Logistics Support Administrator	Science Data Specialist	User Services Representative		ECS M&O Office Manager	ECS SEO Manager	Administrative Assistant	System Administrator	DRPA Analyst	Librarian	Configuration Management Administrator	System Engineer	Software Maintenance Engineer	System Test Engineer	Science Coordinator	Operations Trainer		ILS Contractor Manager	ILS Administrator	ILS Installation Coordinator	ECS Property Administrator	ILS Logistic Engineer		Investigators/Investigator Support	IV&V Contractor	Successor Contractor
Tivoli (Fault & Performance Mgt SW)	Group					x																	x																												
HP Openview Management	Individual					x																	x																				x								
AutoSys (Plan & Sched. SW) Admin	Group																												x														x								
Networker (System Backup SW)	Individual					x																	x																				x								
DCE System Admin (Security SW)	Individual					x																	x																				x								
ClearCase (CM SW) Admin	Group																												x														x								
Accugraph PNM (Physical Network	Individual																												x														x								
Database Mgt- Illustra & Sybase	Individual																				x																						x								
AMASS (Storage Mgt)	Individual					x													x																									x								
FORE Systems - Power Hub 7000	Individual		x														x																										x								
IQ Software (Report Generation)	Group					x																							x														x								
LAN Analyzer (Sniffer)	Individual		x														x																																		
System Administration (SUN, SGI, HP)	Individual		x			x											x						x																				x								
Workstation/Server Maintenance	Individual		x														x																																		

Note 1: Employee experience will influence COTS training requirements.

Note 2: For Release B.0, the term DAAC refers to GSFC, LaRC, NSIDC and

Note 3: Group training refers to COTS training that has been especially arranged and scheduled to accommodate groups of 10 to 20 for one course.
Individual training refers to courses that are scheduled throughout the year by the vendor and may be attended by anyone.

5.5 Release B.0 Course Descriptions & Resource Requirements

Table 5-3 lists the projected Release B.0 lesson topics, provides a brief description of each lesson topic, lists the training source (Hughes developed (Dev) or COTS), provides an estimated course length (Hours), provides an estimate of the equipment utilization (lab time) time (Hours), and provides an estimate of the resources required to conduct the classroom discussion and to conduct practical exercises on the operational equipment.

Table 5-3. Release B.0 Training Course Description & Resource Requirements (1 of 3)

Lesson Topics	Description	Training Type/Course Hours	Release B.0 Equipment Utilization	Resource Requirements
ECS Introduction and System Overview	General system overview.	Dev/4 Hours	0 Hours	1 Classroom
Problem Management	Describes the trouble ticket process.	Dev/4 Hours	2 Hours	1 Classroom, 5 on∞ site workstations with system access
System Administration	Describes system administration tasks.	Dev/16 Hours	8 Hours	1 Classroom, 5 on∞ site workstations with system access
Network Administration	Describes process for monitoring the network.	Dev/4 Hours	2 Hours	1 Classroom, 5 on∞ site workstations with system access
Database Administration	Describes tasks required to maintain the database and perform structure management.	Dev/8 Hours	4 Hours	1 Classroom, 5 on∞ site workstations with system access
Ingest	Describes process for receiving, logging and marking all electronic and non-electronic media.	Dev/4 Hours	2 Hours	1 Classroom, 5 on∞ site workstations with system access
Data Distribution	Describes the process for distribution of products to the user community.	Dev/4 Hours	2 Hours	1 Classroom, 5 on∞ site workstations with system access
Science Software Integration and Test	Describes tasks required to install and test science software.	Dev/16 Hours	8 Hours	1 Classroom, 5 on∞ site workstations with system access
Production Planning and Processing	Describes process for science data production planning and processing	Dev/12 Hours	6 Hours	1 Classroom, 5 on∞ site workstations with system access
Resource Planning	Describes system integration process for all resource requests.	Dev/4 Hours	2 Hours	1 Classroom, 5 on∞ site workstations with system access

Table 5-3. Release B.0 Training Course Description & Resource Requirements (2 of 3)

Lesson Topics	Description	Training Type/Course Hours	Release B.0 Equipment Utilization	Resource Requirements
Archive	Describes process for archiving data.	Dev/8 Hours	4 Hours	1 Classroom, 5 on∞ site workstations with system access
User Services	Describes tasks that support the user community.	Dev/8 Hours	4 Hours	1 Classroom, 5 on∞ site workstations with system
Configuration Management	Describes configuration management process.	Dev/8 Hours	4 Hours	1 Classroom, 5 on∞ site workstations with system access
System Troubleshooting	Describes tasks required to perform system troubleshooting.	Dev/8 Hours	4 Hours	1 Classroom, 5 on∞ site workstations with system access
System Operations	Provides the operators preparations for real∞ world exercises on ECS.	Dev/8 Hours	8 Hours	1 Classroom, 5 on∞ site workstations with system access
Tivoli (Fault & Performance Mgt SW) Administration	Administration of fault and performance management SW.	COTS/40 Hours	Onsite-40 Hours	On-site classroom with workstations
HP OpenView Management	Network management using OpenView.	COTS/40 Hours	None	Vendor classroom with workstations
Accugraph PNM (Physical Network Mgr)	Administration of the HW CM SW.	COTS/40 Hours	Onsite-40 Hours	On-site classroom with workstations
Networker (System Backup SW)	Administration of the system backup SW.	COTS/16 Hours	None	Vendor classroom with workstations
AutoSys (Planning & Sched. SW) Admin	Administration of the planning and scheduling.	COTS/16 Hours	16 Hours	On-site classroom with workstations
DCE System Admin (Security SW)	Administration of the DCE security SW.	COTS/40 Hours	40 Hours	On-site classroom with workstations

Table 5-3. Release B.0 Training Course Description & Resource Requirements (3 of 3)

Lesson Topics	Description	Training Type/Course Hours	Release B.0 Equipment Utilization	Resource Requirements
ClearCase (CM SW) Administration	Administration of the SW CM SW.	COTS/40 Hours	40 Hours	On-site classroom with workstations
AMASS/EMASS (Storage Mgt)	Administration of the Storage Management SW and Robotics Tape Library.	COTS/16 Hours	None	Vendor classroom with workstations
Illustra (Database Mgt) Administration	RDBMS Administration.	COTS/24 Hours	24 Hours	On-site classroom with workstations
IQ Software (Report Generation)	Report development SW.	COTS/24 Hours	24 Hours	On-site classroom with workstations
Sybase Training	RDBMS Administration.	COTS/40 Hours	None	Vendor classroom with workstations
FORE Systems - Power Hub 7000	Administration and troubleshooting of FDDI switch.	COTS/16 Hours	None	Vendor classroom with workstations
LAN Analyzer (Sniffer)	Network troubleshooting using a LAN.	COTS/24 Hours	24 Hours	On-site classroom with workstations
System Administrator (SUN, SGI, HP)	System Administration Solaris Operating System.	COTS/40 Hours	None	Vendor classroom with workstations
Workstation/Server Maintenance (Multi-Processor Maintenance-SUN)	Provides detailed multi∞ processor hardware maintenance skills (LRU level).	COTS/40 Hours	None	Vendor classroom with workstations
Workstation/Server Maintenance (Multi-Processor Maintenance-SGI)	Provides detailed multi∞ processor hardware maintenance skills (LRU level).	COTS/80 Hours per class	None	Vendor classroom with Supercomputers

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6. Release B.0 Detailed Training Development & Implementation Schedule

6.1 Release B.0 Training Events

Figure 6-1 depicts the training events associated with the ECS training program in Release B.0. Specific course dates will be provided as soon as these dates become available and will be reviewed and finalized during the weekly M&O meetings.

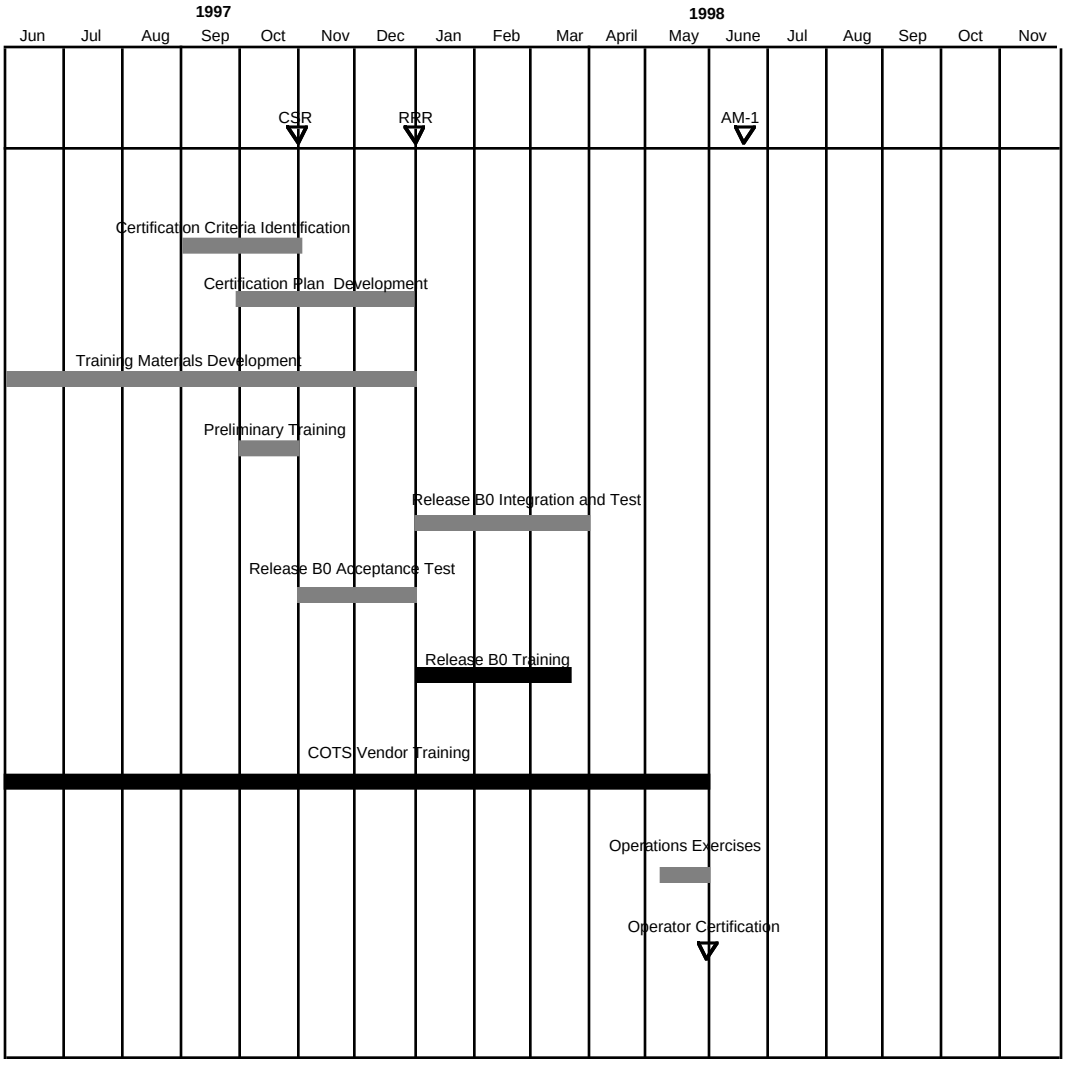

Figure 6-1. Release B.0 Training Program Timeline

All training periods (denoted with solid black lines in Figure 6-1) will be conducted using CR and/or OJT training materials.

Certification will be granted following successful participation of AM-1 operations exercises.

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Abbreviations and Acronyms

AM-1	EOS AM Mission spacecraft 1, morning spacecraft series—ASTER, CERES, MISR, MODIS and MOPITT instruments
API	Applications Program Interface
CBT	Computer Based Training
CCB	Configuration Control Board
CDR	Critical Design Review
CDRL	Contract Data Requirements List
CM	Configuration Management
COTS	Commercial Off-the-Shelf
CR	Classroom presentation
CSCI	Computer Software Configuration Item
DAAC	Distributed Active Archive Center
DBA	Database Administration
DCN	Document Change Notice
DID	Data Item Description
ECS	EOSDIS Core System
EOC	EOS Operations Center
EOSDIS	Earth Observing System Data Information System
ESOD	Earth Science On-line Directory
HW	Hardware
ILS	Integrated Logistics Support
IV&V	Independent Verification and Validation
LAN	Local Area Network
LSM	Local System Management
M&O	Maintenance and Operations
MSS	Management Subsystem
NASA	National Aeronautics and Space Administration
NMOS	Network and Mission Operations Support
ORPA	Operations Readiness and Performance Assurance

OJT	On-the-Job Training
PDR	Preliminary Design Review
PI	Principal Investigator
QA	Quality Assurance
QO	Quality Office
RDBMS	Relational Database Management System
SCDO	Science and Communications Development Office
SE	Sustaining Engineering
SEO	Sustaining Engineering Organization
SMC	System Monitoring and Coordination Center
SME	Subject Matter Expert
SMO	System Management Office
SSI&T	Science Software Integration and Test
SW	Software
T^3	Train-the-Trainer