Planetary Data System

System Delivery Review

February 16, 1990

Planetary Data System
System Delivery Review
February 16, 1990

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PDS System Delivery Review

Review Board Charter

T. Fouser

February 16, 1990

PDS System Delivery Review – Charter

Topics To Be Covered

- Review Board Membership
- SDR Scope and Charter
- Review Criteria
- Review logistics.

PDS System Delivery Review – Charter

Review Board Membership

- The Chairman of the Review Board for the System Delivery Review (SDR) for the Planetary Data System (PDS) Project will be T. Fouser, Software Engineering (SORCE) Group Supervisor, Sec. 366.

- The PDS Review Board will consist of the following members:
  - R. Coffin, Manager, Sec. 317
  - T. Fouser, Software Engineering (SORCE) Group Supervisor, Sec. 366
  - Y. Park, Alaska SAR Facility, Sec. 334
  - R. Slusser, Deputy Chief FPSO System Engineer, Section 317
  - W. Tai, EOS System Engineer, Sec. 317
  - R. Walker, PDS Planetary Plasma Interactions Node Manager, UCLA
  - P. Wiener, OSSI/TAP Representative Division 31

PDS System Delivery Review – Charter

SDR Scope and Charter

- The scope of this review is limited to the PDS Version 1.0 and does not include other aspects of the PDS Project, such as Technology Team activities and Mission Interface Team activities.

- The charter for the review board for the PDS SDR will be as follows:
  - To validate that the PDS has been tested adequately and meets all requirements, or has been granted acceptable liens.
  - To determine that potential problems have been identified and resolved or assigned for action.
  - To determine that the complete set of deliverables is ready for release.
  - To provide a critique of the following documents:
    - PDS Users' Guide (UG)
    - PDS Operations Plan (OP)
    - PDS Release Description Document (RDD)
    - PDS Acceptance Test Plan (ATP)
    - PDS Software Operations Manual (SOM)
    - PDS Data Administration Plan (DAP)

PDS System Delivery Review – Charter

SDR Scope and Charter (Cont.)

- To determine that the following deliverable products are ready for release:
  - PDS Software Specification Document (SSD-1)
  - PDS Catalog Design Document (CDD)
  - PDS Software Interface Specifications (SIS)
  - System Integration and Test Plan (SITP)
  - PDS Software Management Plan (SMP)
- To review the plans for the operational phase of the PDS Version 1.0.

PDS System Delivery Review – Charter

Review Criteria

- The review criteria and document review criteria have been tailored from the JPL D-4000 series of documents.
- The review criteria were distributed with the original PDS SDR charter memo.
- Review Criteria Overview
- Document Review Criteria Overview

PDS System Delivery Review

PDS Project Overview

T. Renfrow

February 16, 1990

PDS System Delivery Review – PDS Project Overview

Topics To Be Covered

- Description of PDS
- Project History
- Project Organization
- Project Status

PDS System Delivery Review – PDS Project Overview

Description of PDS

- The goal of the PDS is to provide a cost effective data archive and distribution system to the planetary science community.
- This involves two categories of data:
  - Ingestion, curation, and distribution of data from active flight missions.
  - Restoration, curation, and distribution of data from past flight missions.
- The functional elements of PDS
  - Management
  - Mission Interface
  - System Engineering
  - System Development
    - Software Development
    - Data Development
  - Operations
  - Science Support

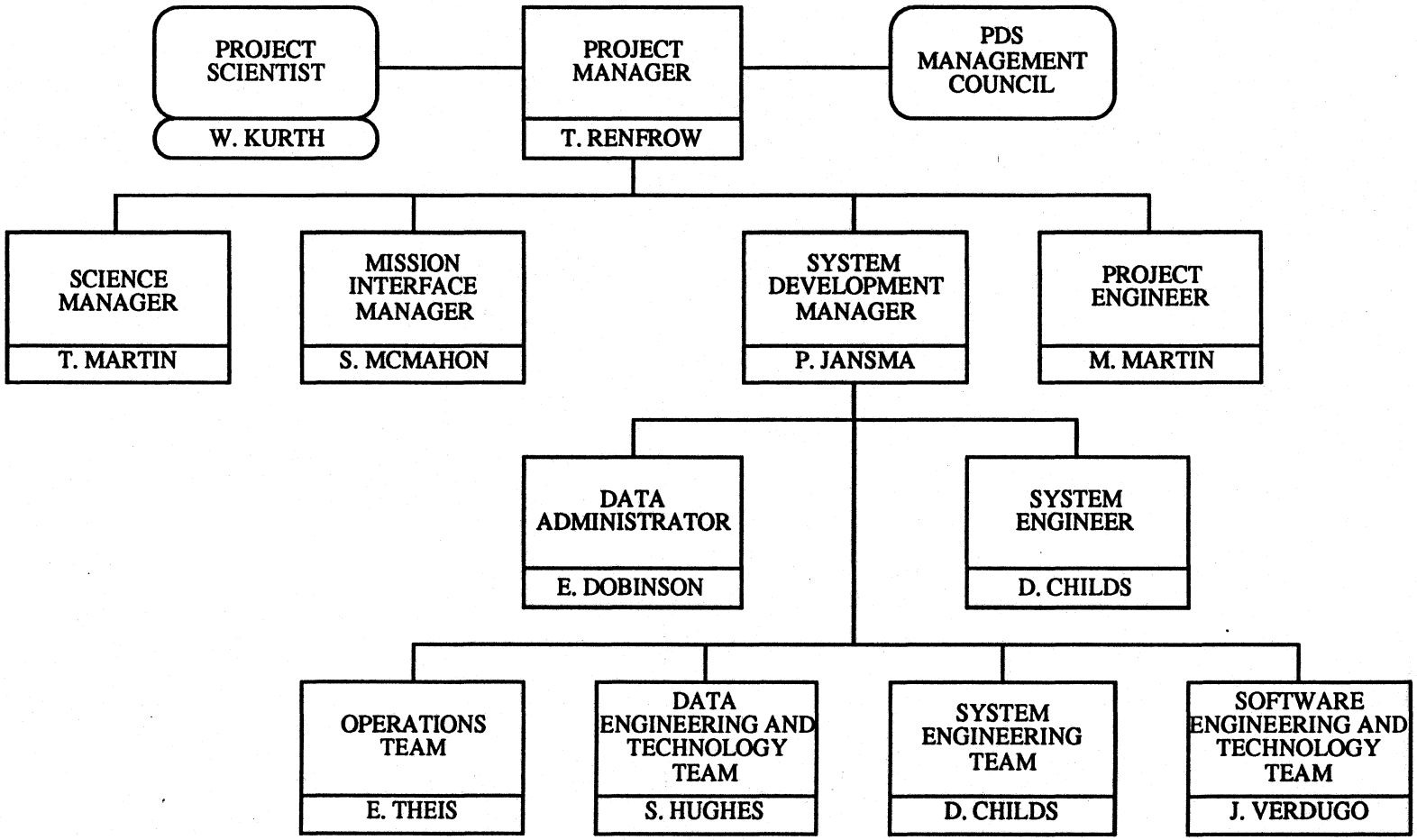
PDS System Delivery Review – PDS Project Overview

Project History

- 1983 – Both the Planetary Data System Project (sponsored by Code EL) and the Pilot Planetary Data System Project (sponsored by Code EC) are started.
- 1985 – The two projects are merged into the Planetary Data System.
- 1987 – Prototype catalog system is demonstrated.
- 1988 – Informal Incremental Release of Version 1.0 is available.
- 1989 – Version 1.0 beta test is demonstrated.
- 1990 – Version 1.0 is completed. Discipline Nodes become operational.

PDS System Delivery Review – PDS Project Overview

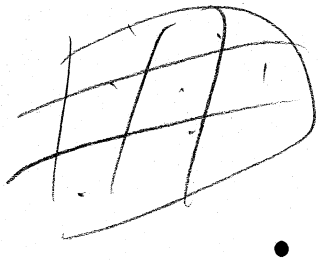
Project Organization



PDS System Delivery Review – PDS Project Overview

Project Status

- Mission Interface
  - Sue McMahon has been appointed Mission Interface Manager.
  - Detailed working relationships have been established with Magellan, Mars Observer, Galileo, and SFOC.
  - For each project interface there will be a person selected as the coordinating point of contact from PDS.
  - Both the Discipline Node scientists and the Central Node engineers will work with the missions and the data producers on the missions.



- Project Engineering
  - Standards – A fairly complete specification of the Object Description Language for PDS labels is being produced.
  - CD-ROM development efforts – Coordination activities are being defined for Voyager Neptune data and Viking images.
  - MOUs – Construction of MOU with FPSO/SFOC is under negotiation. Construction of MOU with MIPL will begin soon.
  - Data Archive Plans – Construction of Galileo Data Archive and Transfer Plan should be completed in September.

Mike M. – January

PDS System Delivery Review – PDS Project Overview

Project Status (Cont.)

- Technology
  - CD-ROM production process understood for DOS, Macintosh, UNIX, and VMS environments. Tools for data set preparation and organization being developed.
  - Interactive hypertext display of key project documents in prototype stage.
  - Development of both batch and interactive labels tools in preparation.

- Discipline Node Transition
  - Discipline Node contract paper work in JPL procurement process.
  - Preliminary version of Discipline Node schedules already developed.
  - Transition plans being developed and completed by March.
  - First Node Manager Meeting held in December, 1989 to orient new managers and identify critical issues.
  - Next Node Manager Meeting will be in March, 1990 to discuss data set restoration/ingestion priorities and to complete integration of Discipline Node and Central Node schedules.

- Completion of Version 1.0
  - All system development and documentation (except SSD-2) is completed.
  - Users are being given access to the system.
  - SSD-2 documents will be completed by May, 1990.

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PDS Version 1.0 Overview

D. Childs

February 16, 1990

PDS System Delivery Review

PDS Version 1.0 Overview

Topics

- Functional Areas
- External Interfaces
- Distributed Architecture
- Functional Diagrams
- System Usage Scenarios
- Software and Data Architecture
- Development History and Schedule

PDS System Delivery Review

PDS Version 1.0 Overview – Functional Areas

- Access System – Manages the interaction of the user with the system. Controls the communications functions for the user.
- Inspect Data – Allows the user to retrieve an display high–level and detailed–level catalog data via either menu responses or commands.
- Order Data – Validates a data order, locates the ordered data, and determines if the order can be reasonably filled, and then confirms the order with the user.
- Distribute Data – Routes the order to the appropriate Testbed Node or NSSDC which then distributes the ordered data. At the Testbed Nodes, data orders are processed manually and shipped in the most cost effective manner.
- Administer Data – Manages the data and the databases of the system and manages the receipt of data from outside sources such as researchers and data restoration activities.
- Administer System – Provides customer support and maintains system data.
- Prepare Data – Performs quality control checks on the data, conducts peer review, loads the catalog, and prepares the data for archive.

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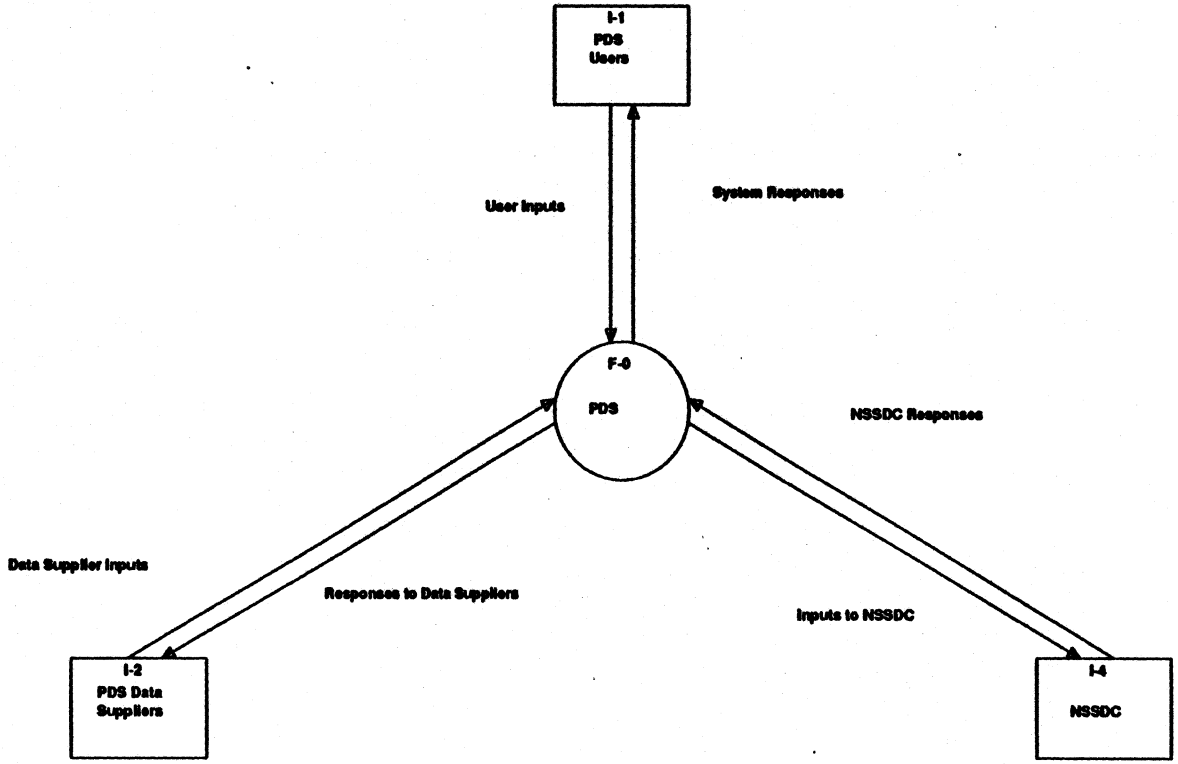
PDS Version 1.0 Overview – External Interfaces



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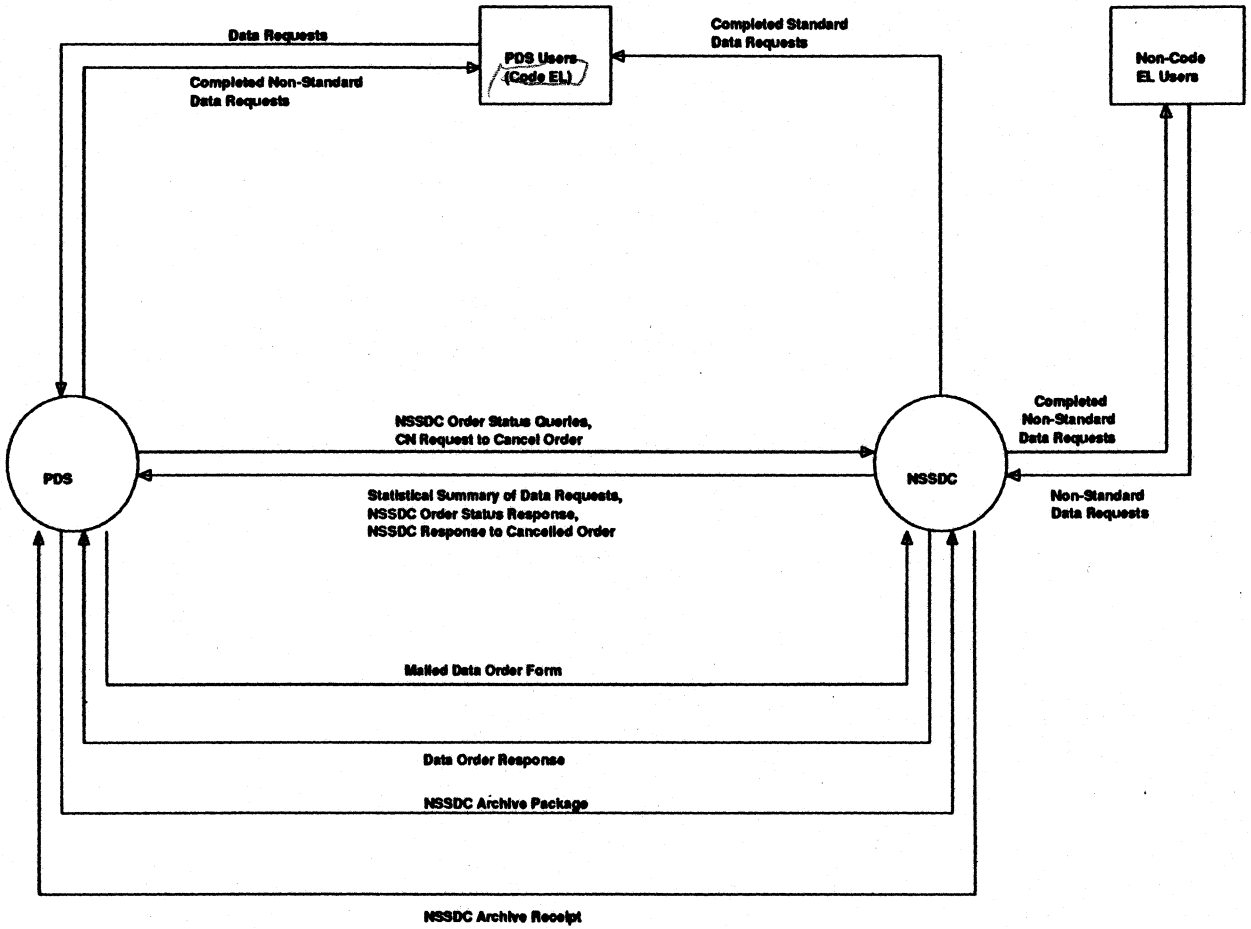
PDS Version 1.0 Overview – External Interfaces (Cont.)



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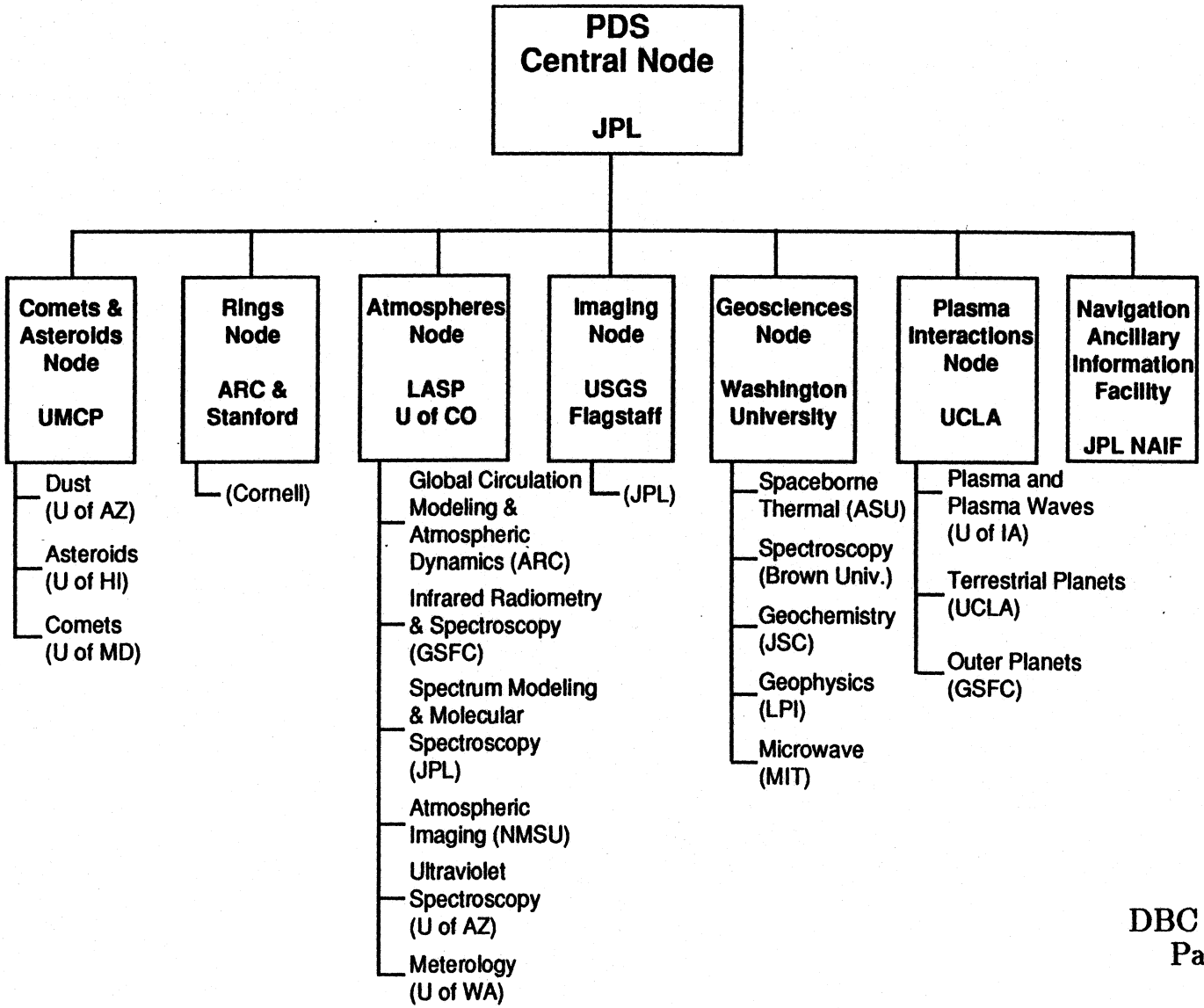
PDS Version 1.0 Overview – Distributed Architecture

- The high–level system architecture at delivery consists of the Central Node, seven Discipline Nodes and their associated Subnodes:
  - Central Node at JPL
  - Planetary Geosciences at the RPIF, Washington University
  - Planetary Atmospheres at LASP, University of Colorado
  - Planetary Plasma Interactions at UCLA
  - Planetary Rings at Ames Research Center
  - Planetary Images at the USGS ~~in~~ Flagstaff, AZ JPL
  - Comets and Asteriods at the University of Maryland
  - NAIF at JPL

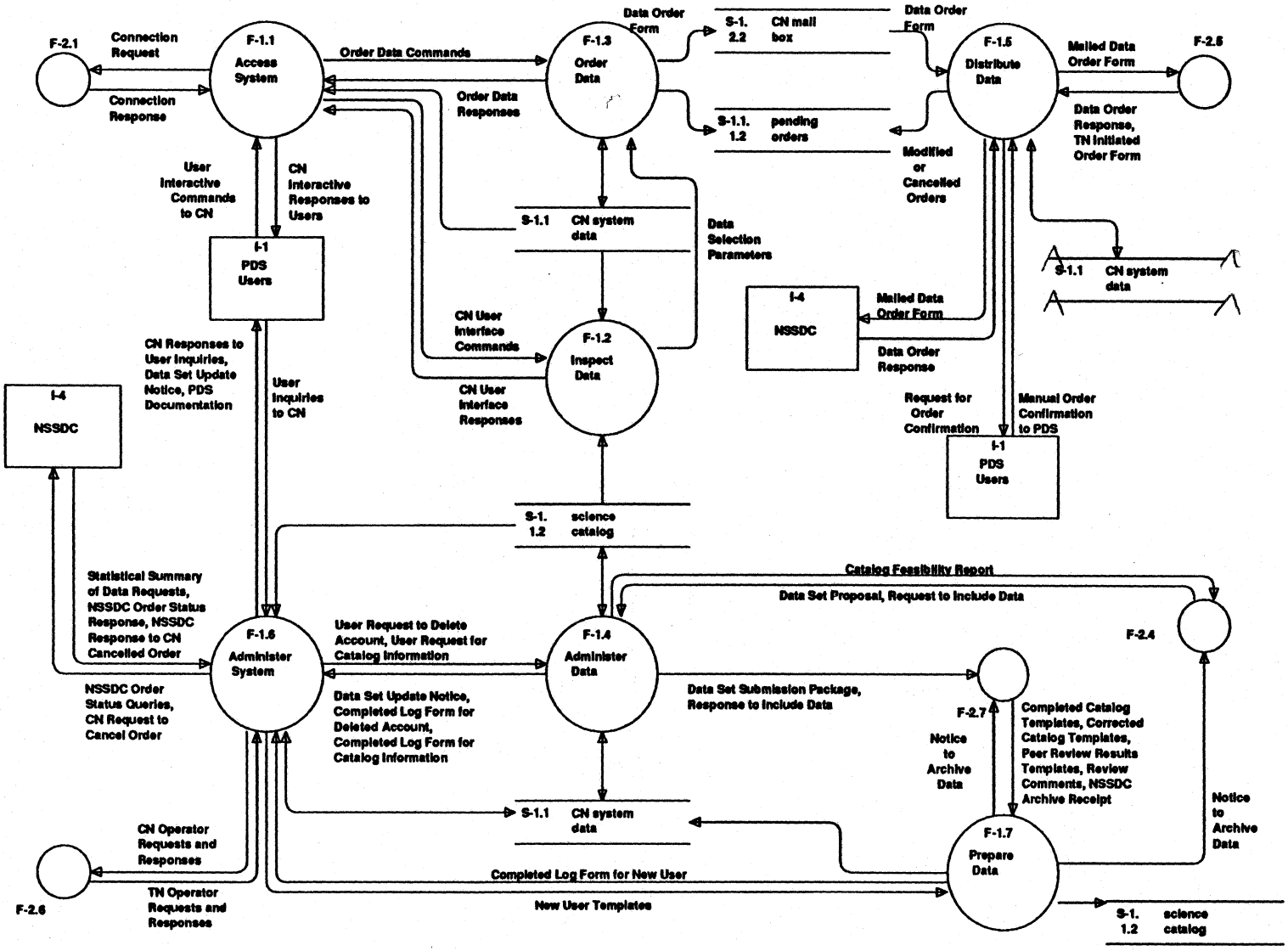
PDS System Delivery Review

PDS Version 1.0 Overview – Distributed Architecture (Cont.)



PDS System Delivery Review

PDS Version 1.0 Overview – Functional Diagrams



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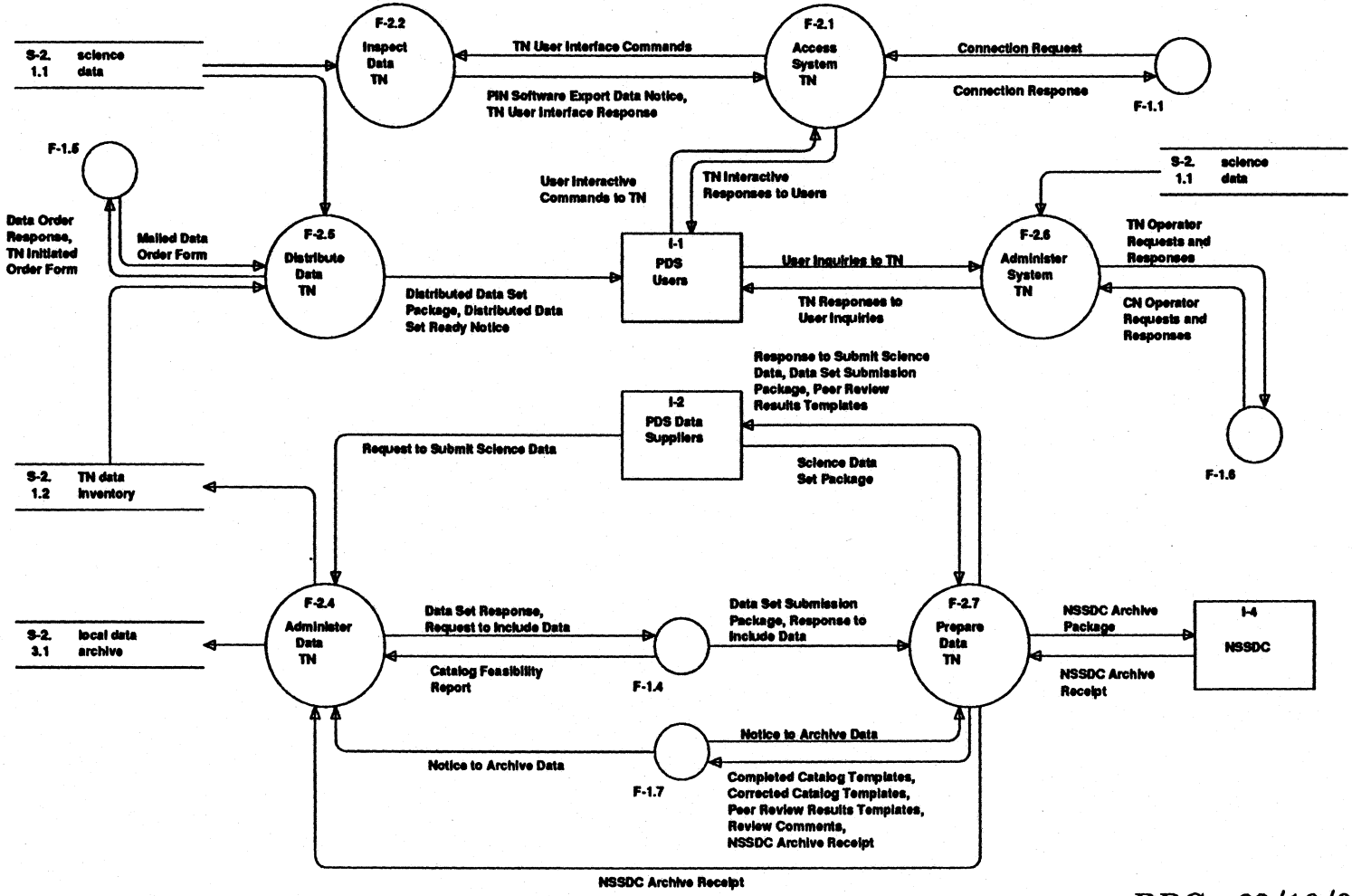
PDS Version 1.0 Overview – Functional Diagrams (Cont.)



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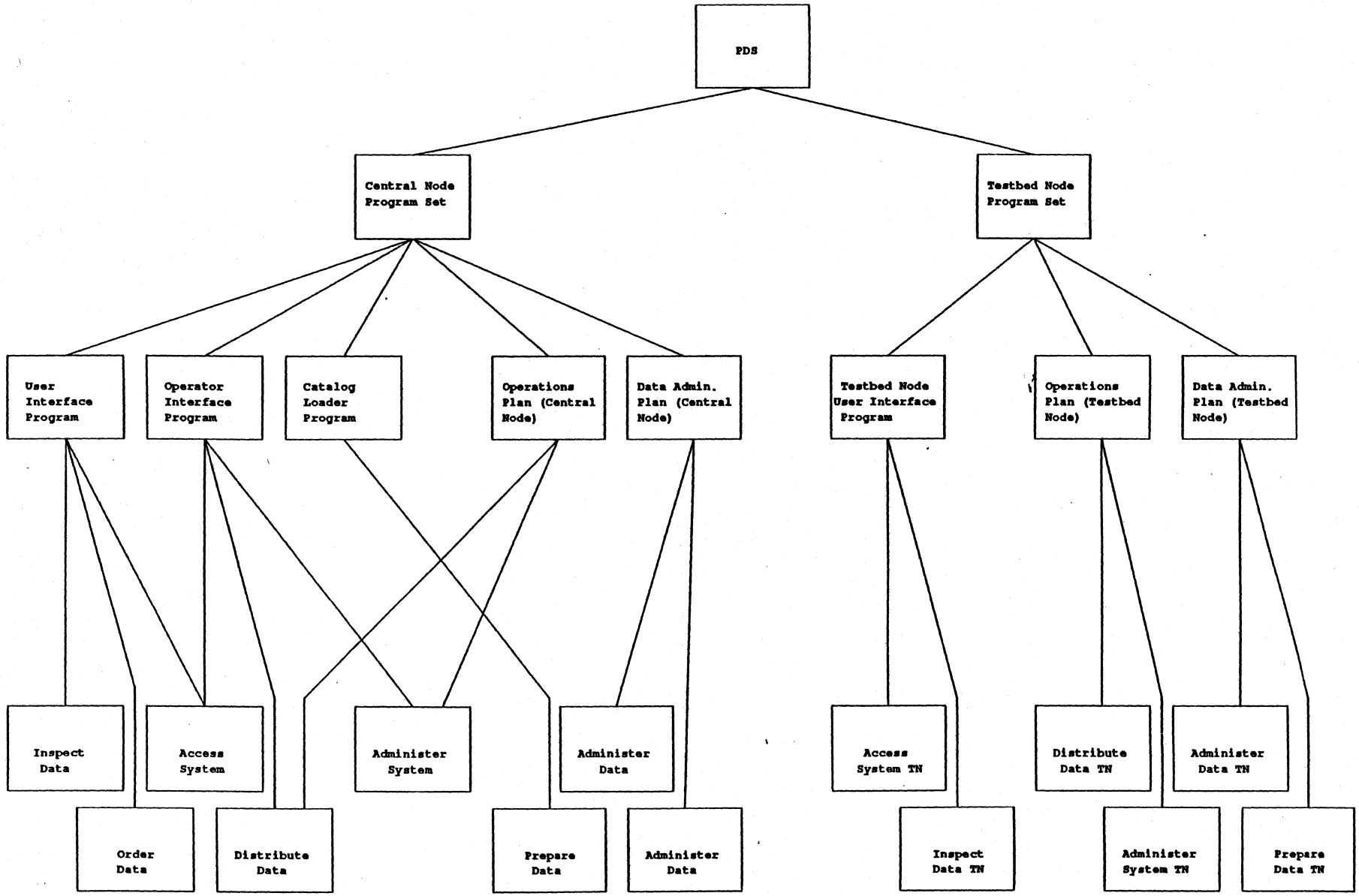
PDS Version 1.0 Overview – System Usage Scenarios

- Data Ingestion Scenario
- New User Scenario
- Data Inspection and Ordering Scenario
- Data Distribution Scenario

PDS System Delivery Review

PDS Version 1.0 Overview – Software Architecture



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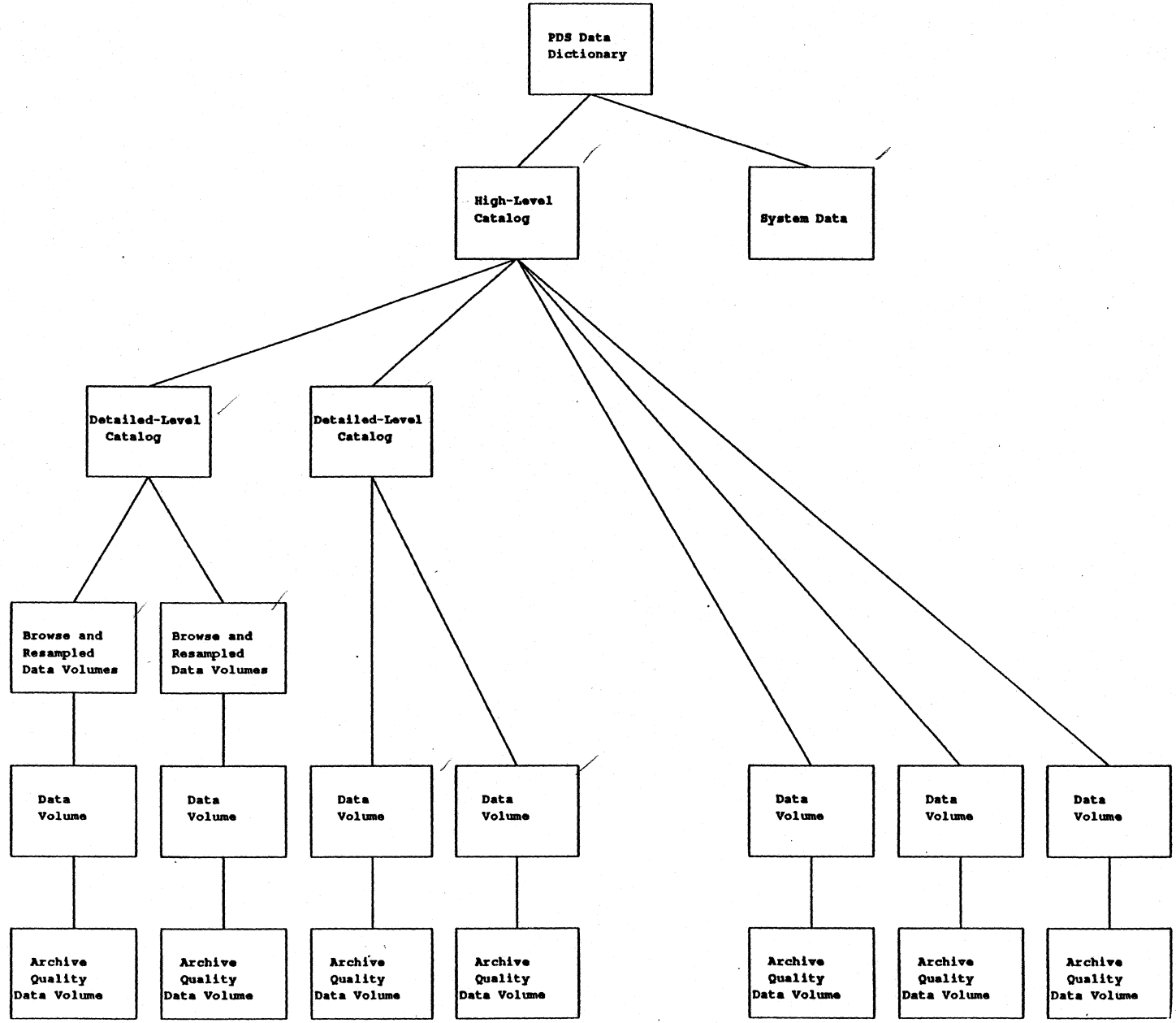
PDS Version 1.0 Overview – Data Architecture



PDS System Delivery Review

PDS Version 1.0 Overview – Development History

- The development of Version 1.0 began prior to the acceptance of the JPL Software Management Standard 500-152 (precursor to D-4000).
- The user requirements were obtained from user interviews, user scenarios, prototyping, and documentation surveys. User requirements were grouped into Version 1, 2, and 3 requirements.
- A high-level system specification was synthesized from analysis of the user requirements. The Structured Analysis and System Specification methodology was used.
- A *PDS User Requirements Document* was produced which was organized according the functional partitioning in the system specification.
- The Version 1.0 user requirements were decomposed into functional requirements and other functional requirements were derived.
- To further limit the scope of Version 1.0, the functional requirements were prioritized and a subset was assigned for the Version 1.0 development. The remainder were to be postponed to future versions.
- The *PDS Functional Requirements Document* was produced and reviewed at the Functional Requirements Review.

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PDS Version 1.0 Overview – Development History (Cont.)

- A group of ECRs was proposed by the user community. Most of the ECRs were accepted by the CCB. These ECRs increased the scope of Version 1.0 significantly (i.e. from a centralized to a distributed system).
- The PDS development team was directed to use the JPL Software Management Standard 500-152 (precursor to D-4000).
- The PDS Version 1.0 system was classified as a Class 2 software system.
- A *PDS Functional Design Document* was produced which contained the functional design of the Version 1.0 system and the software requirements. A separate Software Requirements Document was not produced.
- The Version 1.0 development continued into the design phases using the life cycle, required documents, and required reviews as prescribed by D-4000.
- The PDS Project has consistently maintained a close working relationship with its user community.

PDS System Delivery Review

PDS Version 1.0 Overview – Development Schedule

JPL

APPROVAL: _____ J. T. Renfrow

ACHIEVEMENT: _____ P. A. Jansma

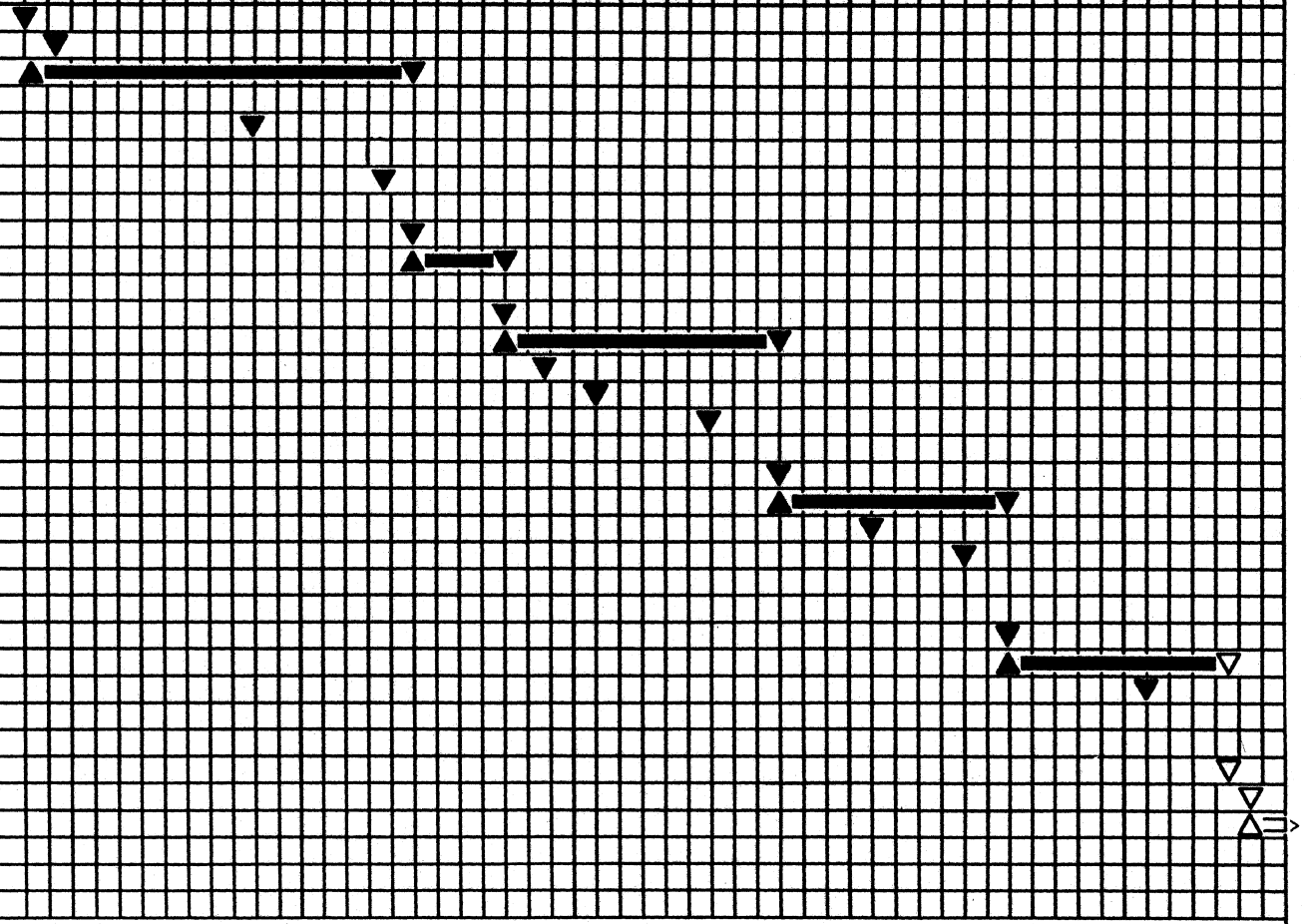
Planetary Data System

Version 1.0 Development Schedule

Actual

STATUS AS OF: 02-14-90
REV A, DATE: 02-14-90
CREATION DATE: 02-14-90

	ACTIVITY
1	Pilot PDS Demo at DPS
2	PPDS Becomes PDS
3	Requirements Analysis Phase
4	URD, FRD
5	Functional Reqmts Review
6	Task Implementation Plan
7	Task Implementation Review
8	Software Management Plan
9	Software Management Review
10	Functional Design Phase
11	FDD, Prelim. DAP
12	Preliminary Design Review
13	Detailed Design Phase
14	PIN Software Reqmts Review
15	PDS Prototype Demo at DPS
16	PIN Software Design Review
17	SSD, SIS, CDD, Prelim. UG
18	Critical Design Review
19	Implementation and Test Phase
20	Incremental Release at DPS
21	PIN S/W Acceptance Review
22	SITP, Prelim. OP
23	Prelim. SOM, ATP
24	Implementation Status Review
25	Integration/Acceptance Test Phase
26	Version 1.0 Demo at DPS
27	Final UG, Final OP, Final SOM
28	Final DAP, ATP/ATR, RDD
29	System Delivery Review
30	System Delivery
31	Operations and Maintenance Phase



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Operation Plans

D. Childs

February 16, 1990

PDS System Delivery Review

PDS Operational Plans

Topics

- Introduction to PDS Operations
- Operations Organization and Roles
- Operations Policies
- Summary of Central Node Operations Tasks
- Summary of Discipline Node Operations Tasks
- Description of the Software Operator's Manual
- Central Node Operations Schedule
- Operational Scenarios and Analysis

PDS System Delivery Review

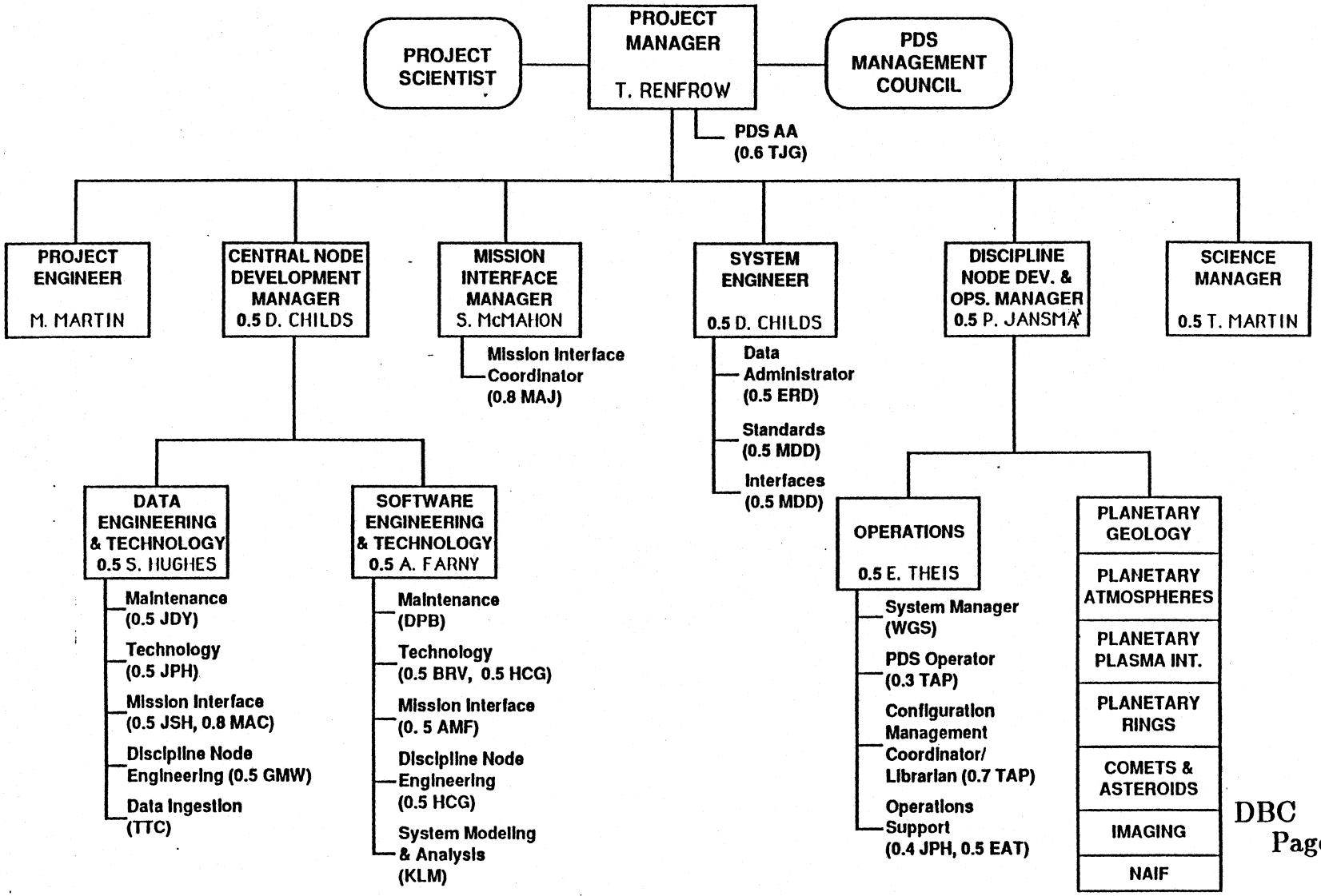
PDS Operational Plans – Introduction to PDS Operations

- Operational Areas
  - Customer Support
  - System Administration
  - System Operations
  - Data Administration
  - Software Management
- Scope of Central Node and Discipline Node Operations
- Supporting Documentation
  - Operations Plan
  - Software Operator's Manual
  - Data Adminstration Plan
  - Software Management Plan
  - Work Implementation Plan

PDS System Delivery Review

PDS Operational Plans – Central Node Operations Organization and Roles

(with Nominal Weekly Manpower Allocations to Tasks)



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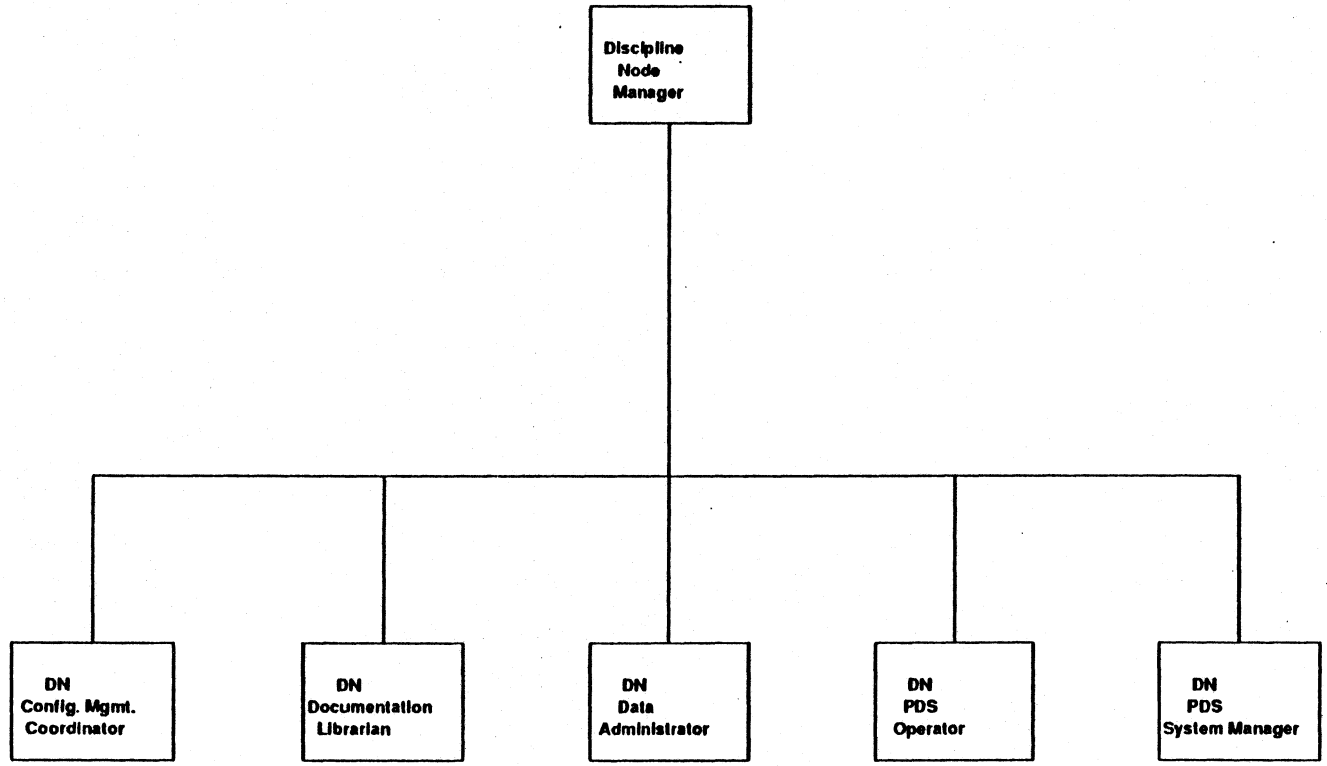
PDS System Delivery Review

PDS Operational Plans – Discipline Node Operations Roles



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PDS Operational Plans – Operations Policies

- Priorities
- System Hardware Policies
- System and Application Software Policies
- Communications Management Policies
- Security Policies

PDS System Delivery Review

PDS Operational Plans – Summary of Central Node Operations Tasks

- PDS Operator Tasks
  - Providing Customer Support
    - Tracking Customer Support Requests
    - Maintaining User Accounts
  - Processing Data Orders
    - Adminstration Only
  - Generating System Data Reports
    - Order Administration
    - System Usage and Performance
  - Updating System Data
  - Archiving System Data

PDS System Delivery Review

PDS Operational Plans – Summary of Central Node Operations Tasks (Cont.)

- PDS Librarian
  - Distributing the PDS Version 1.0 Documentation
  - Maintaining Document Distribution Information
  - Maintaining the Document Management System
  - Maintaining the PDS Documentation Library
- System Manager Tasks
  - Manage and Maintain the System Hardware
  - Manage and Maintain the System Software
  - Backup System Software, Application Software, and Databases
  - Manage and Maintain System Communications
  - Maintain System Security
  - User Support

PDS System Delivery Review

PDS Operational Plans – Summary of Discipline Node Operations Roles

- PDS Operator Role
  - Providing Customer Support – Consult on Science Data
  - Processing Data Orders – Data Distribution
- PDS Librarian Role
  - Providing PIN and NIN Software Documentation
- System Manager Role (if applicable)
  - Manage and Maintain the System Hardware
  - Manage and Maintain the System Software
  - Backup System Software, Application Software, and Databases
  - Manage and Maintain System Communications
  - Maintain System Security
  - User Support

PDS System Delivery Review

PDS Operational Plans – Description of Software Operator's Manual

- The Software Operator's Manual (SOM) explains how to use the Operator's Interface Software.
- It is the User's Guide for the Operator Interface.
- The Operator Interface gives the PDS Operator access to user and order information maintained in the PDS Catalog database.
- The PDS Operator may view, update, or generate reports on user and order information.

PDS System Delivery Review

PDS Operational Plans – Description of SOM (Cont.)

- The SOM was patterned after the PDS User's Guide. It contains descriptive sections:
  - Getting Started
  - Sample Scenarios
  - Operator Interface Environment
  - Navigating the Operator Interface
  - Using the Operator Interface Screens
  - Printing a Report
  - Using the Mailbox Utilities
- And reference sections:
  - Operator Interface Menus
  - Operator Interface Screens and Utilities
  - The Operator Interface Physical Environment
  - Sample Forms
  - Glossary
  - Error Messages
  - Index

PDS System Delivery Review

PDS Operational Plans – Central Node Operations Schedule

JPL

APPROVAL: _____ J. T. Renfrow

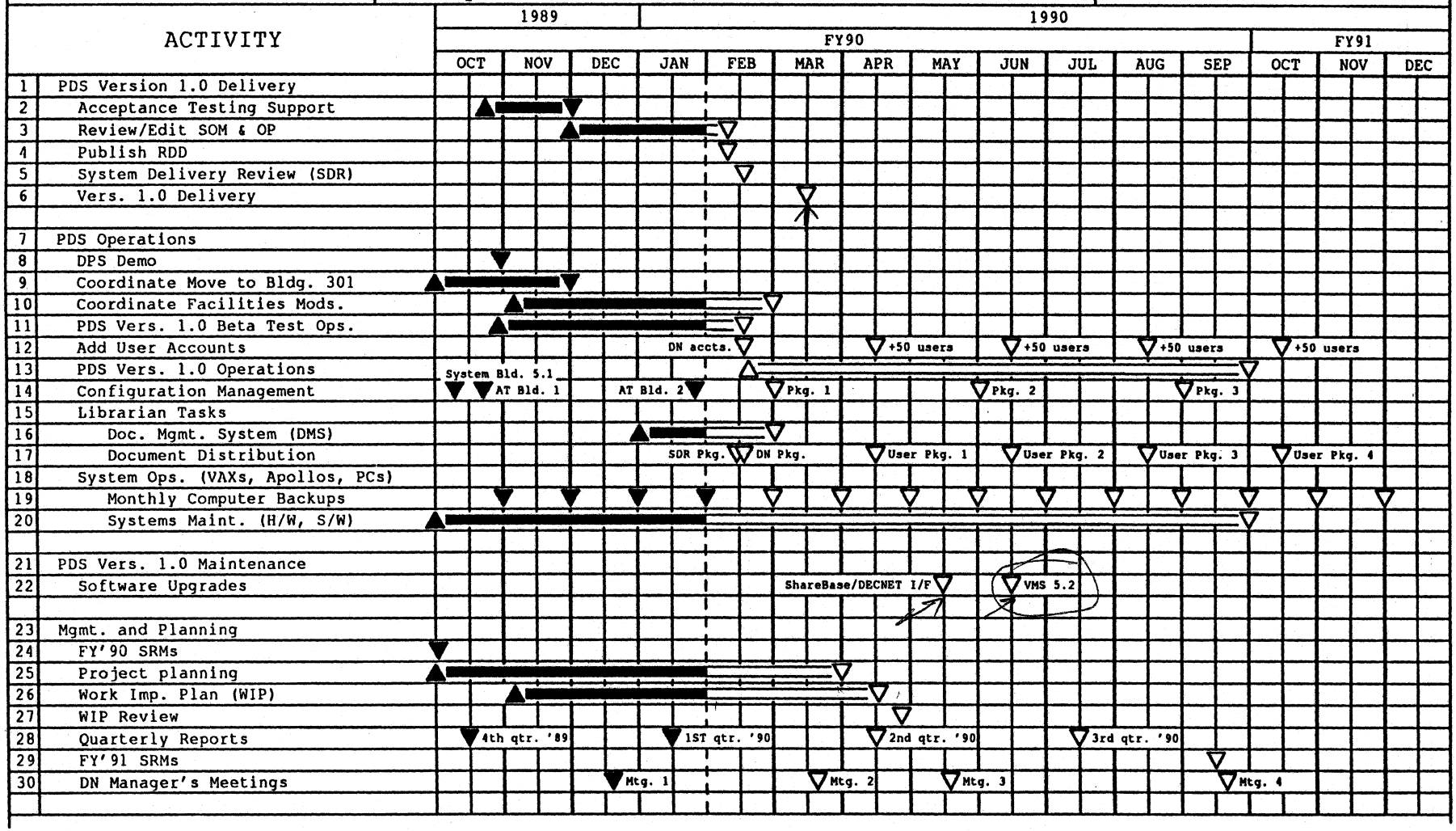
ACHIEVEMENT: _____ P. A. Jansma

Planetary Data System

PDS Operations Team

Operations and Maintenance Phase (FY90)

STATUS AS OF: 01-31-90
REV A, DATE: 02-12-90
CREATION DATE: 01-29-90



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PDS Operational Plans – Operational Scenarios and Analysis

- Quarterly Throughput Assumptions
  - 56 Man days per quarter (226 man days per FY)
  - 50 New user requests
  - 150 Data orders
  - 50 Data order discrepancies (25 OK, 15 Resolved, 10 Cancelled)
  - 150 Customer requests
  - 200 Discipline Node initiated orders

PDS System Delivery Review

PDS Operational Plans – Operational Scenarios and Analysis (Cont.)

PDS Operations Scenarios

	Task	Duration/Frequency		Hours/Week
1	Customer Support Tasks	6.78 h/d		
	Providing Customer Support			
	Receiving Customer Support Requests	0.25 h @ 150 /Q		3.34
	Logging Customer Support Requests	0.25 h @ 150 /Q		3.34
	Contacting the Data Distributors	0.25 h @ 50 /Q		1.12
	Forwarding Technical Inquiries	0.25 h @ 100 /Q		2.23
	Processing User Comments	0.25 h @ 20 /Q		0.45
	Maintaining User Accounts	0.25 h @ 30 /Q		0.67
	Registering New Users	0.25 h @ 50 /Q		1.12
	Submitting a Problem/Failure Report	0.25 h @ 10 /Q		0.22
	Processing Data Orders			
	Processing Data Order Forms	0.25 h @ 150 /Q		3.34
	Processing Data Order Responses	0.25 h @ 300 /Q	(2/or.)	6.67
	Processing Node Initiated Orders	0.25 h @ 200 /Q		4.46
	Updating Order Status Information	0.25 h @ 300 /Q		6.67
	Cancelling Orders	0.25 h @ 10 /Q		0.22
2	Updates to System Data	0.5 d/m		1.00
3	Generating Reports	1 d/m		2.00
			Total:	35.85

PDS System Delivery Review

PDS Operational Plans – Operational Scenarios and Analysis (Cont.)

Systems Operations Scenarios

	Task		Duration/Frequency	Hours/Week
1	System Security		0.5 h/d	2.5
2	System Backups		13 h/w	13.0
	VAX (automated)	(5 disks, 2 Gbytes)	(0.5 h/d)	
	Apollos	(5 nodes, 700 Mbytes)	(5 h/w)	
	ShareBase Server 700	(4 disks, 0.5 Gbytes)	(0.5 h/w)	
	IBM PC ATs	(18 PCs, 360 Mbytes)	(10 h/m)	
	MacIntoshes	(3 MACs, 100 Mbytes)	(2 h/m)	
3	"Hung" system (or crashed, or deadlocked)		8 h/ 4 w	2.0
4	ShareBase Server 700 Problems		40 h/Q	3.3
5	Communications Problems		0.75 h/d	3.75
6	Major User Problems or Complaints		1 h/d	5.0
7	Scheduled Maintenance (and ad hoc maintenance)		5 h/w	5.0
8	Minor User Problems or Complaints		0.5 h/d	2.5
9	Minor System Problems		0.25 h/d	1.25
10	Upgrades or Enhancements		2 d/m	4.0
11	System Tuning		0.25 h/d	1.25
			Total:	43.55

PDS System Delivery Review

PDS Operational Plans – Operational Scenarios and Analysis (Cont.)

Configuration Management Coordinator and Librarian Scenarios

	Task	Duration/Frequency	Hours/Week
1	Support System Builds	1 w/build, 3 builds/Q	3.3
2	Support PDS Change Control	1 d/w	8.0
3	Support Document Distribution		
	PDS Document Requests	1 d/w	0.5
	IMDISP and CD-ROM requests	0.25 d/m	0.5
	Maintaining the PDS Document Library	0.25 d/w	0.5
4	Support Software Engineering and Technology Team	0.5 d/w	4.0
	AOC Tracking PFR Tracking Maintenance on the PDS Build Procedures		
5	Complete CM Tasks	1 d/w	8.0
	Maintaining the Change Control Tracking System Building the Document Management System		
		Total:	24.8

PDS System Delivery Review

Data Administration Plans

S. Hughes

February 16, 1990

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PDS SYSTEM DELIVERY REVIEW--PDS DATA ADMINISTRATION

TOPICS TO BE COVERED

- **OVERVIEW OF DATA ADMINISTRATION FOR VERSION 1.0**
  - DATA ADMINISTRATION
  - DATA INGESTION
  - DATABASE ADMINISTRATION
  - ORGANIZATION AND ROLES
  - CENTRAL NODE VS DISCIPLINE NODE ACTIVITIES
- **DATA ADMINISTRATION ACTIVITIES POST DELIVERY**
  - CONTINUED DATA SET RETORATION
  - MISSION INTERFACE SUPPORT
  - DATA DICTIONARY EVOLUTION

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PDS SYSTEM DELIVERY REVIEW--PDS DATA ADMINISTRATION

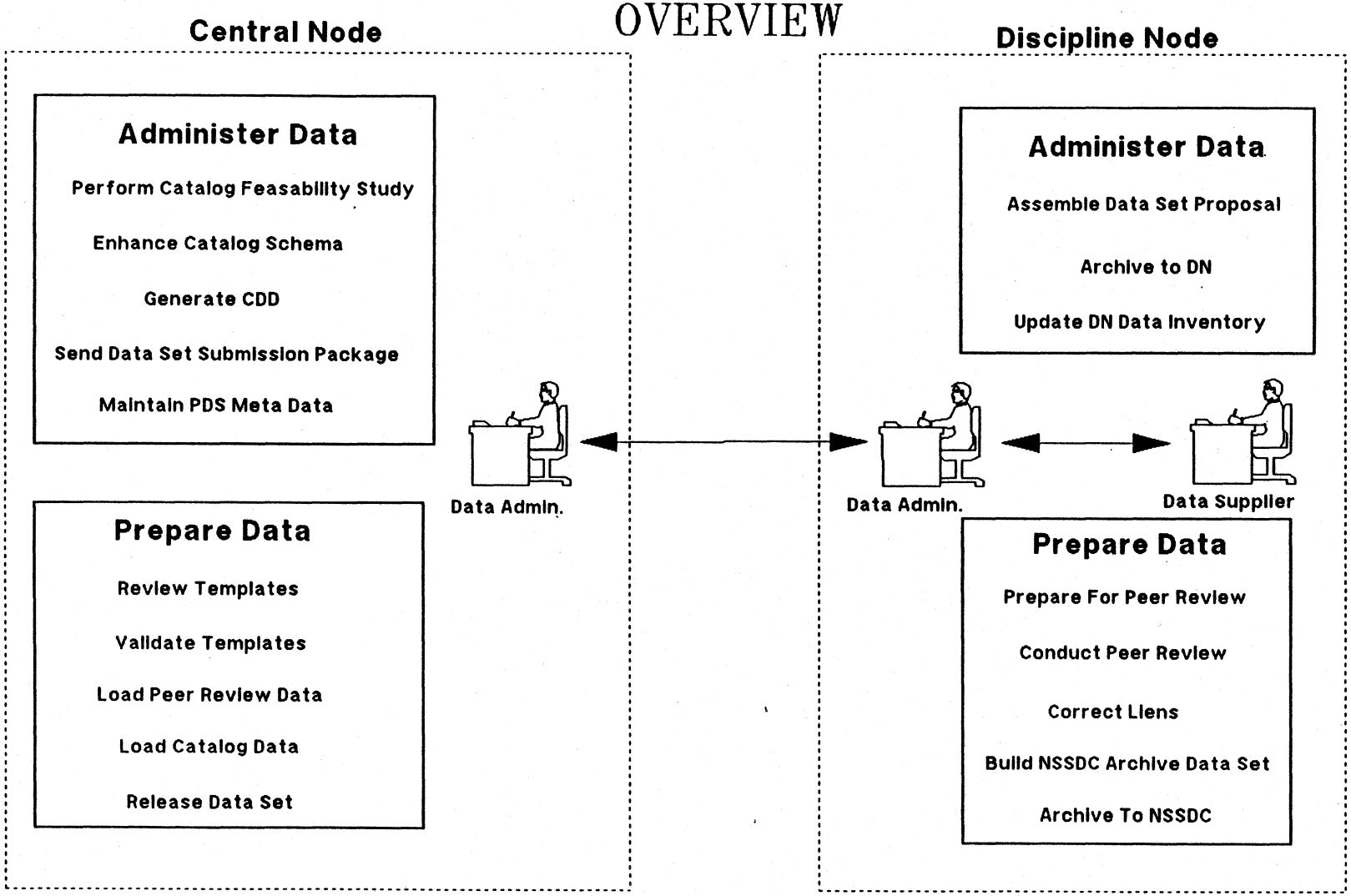
PDS DATA ADMINISTRATION

- **DEVELOPMENT AND IMPLEMENTATION OF POLICIES, PROCEDURES AND GUIDELINES THAT ENSURE A CONSISTENT DATA SYSTEM**

- **OVERVIEW OF DATA ADMINISTRATION FOR VERSION 1.0**

  - **ACQUISITION OF RESTORED DATA FROM PAST FLIGHT PROJECTS**
  - **DATA ADMINISTRATION PLAN**
    - **ADMINISTER DATA AND PREPARE DATA FUNCTIONS FOR PDS**
      - DATA INGESTION
      - ADMINISTRATION OF PDS CATALOG AND DATABASE SERVER
    - **DOCUMENT STRUCTURE**

PDS SYSTEM DELIVERY REVIEW -- PDS DATA ADMINISTRATION OVERVIEW



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PDS SYSTEM DELIVERY REVIEW--PDS DATA ADMINISTRATION

DATA INGESTION

- **THE BEGINNING PHASE: PLANNING AND SCHEDULING**
  - **DATA SET PROPOSAL**
  - **DATA SET FEASIBILITY STUDY**

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PDS SYSTEM DELIVERY REVIEW--PDS DATA ADMINISTRATION

DATA INGESTION

THE MIDDLE PHASE: DATA PREPARATION AND REVIEW

- TEMPLATE GENERATION
- DATA SET SUBMISSION PACKAGE
- CATALOG SCHEMA UPDATES
- PEER REVIEW PREPARATION
- TEMPLATE VALIDATION
- DATA LOADING
- PEER REVIEW
- PEER REVIEW LIENS

JPL

PDS SYSTEM DELIVERY REVIEW--PDS DATA ADMINISTRATION

DATA INGESTION

THE END: DATA ARCHIVING AND CATALOG LOADING

- **DATA SET ARCHIVE BUILD**
- **NSSDC ARCHIVE**
- **DISCIPLINE NODE ARCHIVE**
- **DISCIPLINE NODE INVENTORY**
- **DATA SET RELEASE**

JPL

PDS SYSTEM DELIVERY REVIEW--PDS DATA ADMINISTRATION

DATABASE ADMINISTRATION

- ADMINISTRATION OF CATALOG DATA
- ADMINISTRATION OF SOFTWARE
- ADMINISTRATION OF DATABASE SERVER

JPL

PDS SYSTEM DELIVERY REVIEW--PDS DATA ADMINISTRATION

ORGANIZATION AND ROLES

- **DATA ADMINISTRATOR**
  - RESPONSIBLE FOR DEVELOPMENT OF POLICIES PROCEDURES, AND GUIDELINES THAT ENSURE A CONSISTENT DATA SYTEM
  - SUPPORT DATA SET PRIORITIZATION
- **DATA ENGINEER**
  - RESPONSIBLE FOR IMPLEMENTATION OF POLICIES, PROCEDURES AND GUIDELINES
  - SUPPORT DATA ADMINISTRATOR
- **DATABASE ADMINISTRATOR**
  - RESPONSIBLE FOR MAINTAINING PHYSICAL DATABASE

JPL

PDS SYSTEM DELIVERY REVIEW--PDS DATA ADMINISTRATION

CENTRAL NODE VS DISCIPLINE NODE ACTIVITIES

CENTRAL NODE

- **DEVELOP POLICIES, PROCEDURES AND GUIDELINES FOR INTER DISCIPLINE DATA ADMINISTRATION**
- **ADMINISTER CENTRAL CATALOG SYSTEM**
- **ADMINISTER INTERFACE BETWEEN CENTRAL NODE, DISCIPLINE NODES, AND NSSDC**

JPL

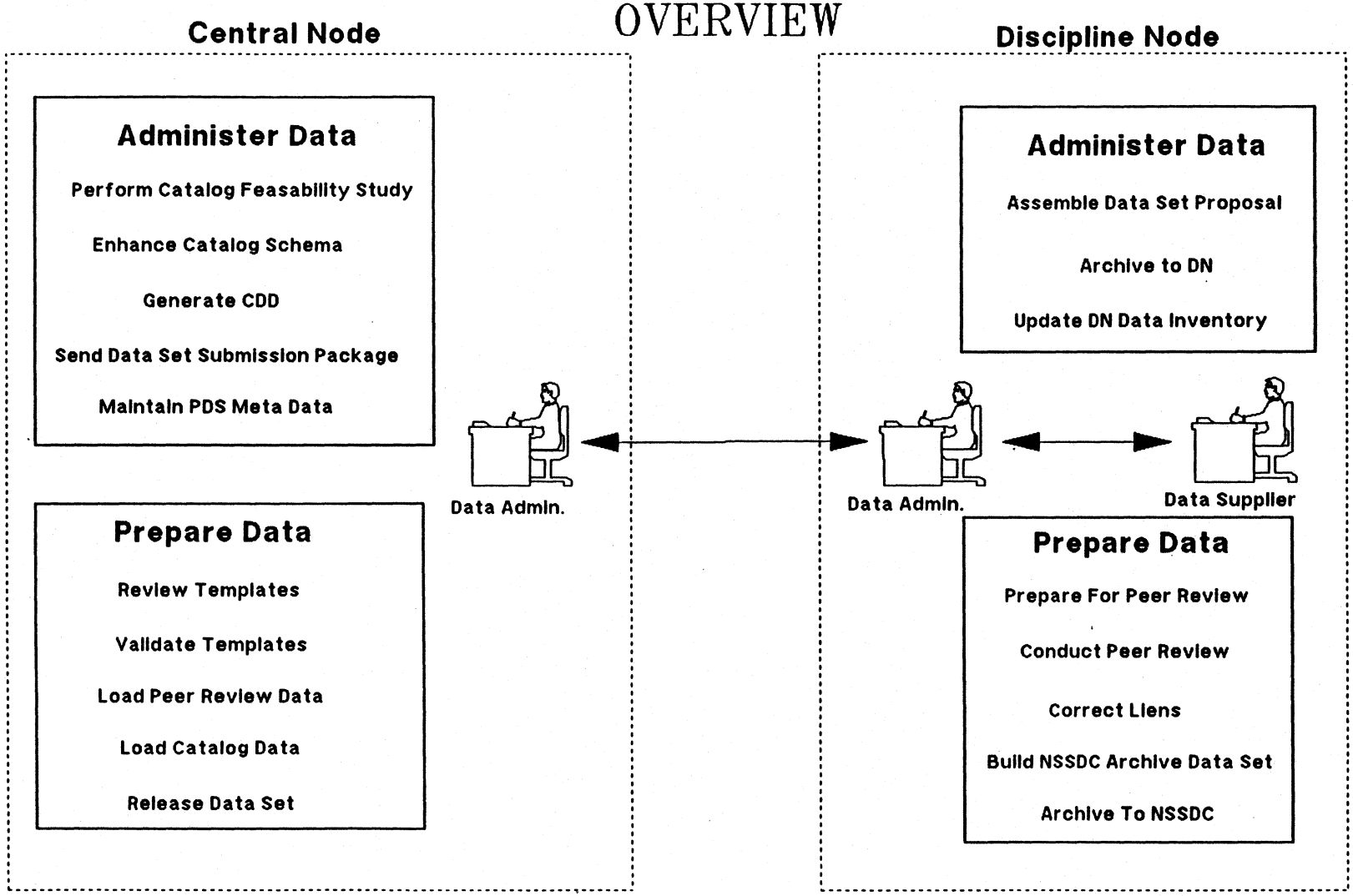
PDS SYSTEM DELIVERY REVIEW--PDS DATA ADMINISTRATION

CENTRAL NODE VS DISCIPLINE NODE ACTIVITIES

DISCIPLINE NODE

- **SUPPORT CENTRAL NODE IN IMPLEMENTING POLICIES, PROCEDURES, AND GUIDELINES AT THE DISCIPLINE LEVEL**
- **ADMINISTER DISCIPLINE-SPECIFIC SCIENCE DATA**
  - MANAGE SUBMISSION AND PREPARATION OF ARCHIVE PACKAGE
  - MAINTAIN LOCAL ARCHIVE
  - SUPPORT USER DATA REQUESTS
- **INTERFACE WITH DATA SUPPLIER**

PDS SYSTEM DELIVERY REVIEW -- PDS DATA ADMINISTRATION OVERVIEW



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PDS SYSTEM DELIVERY REVIEW--PDS DATA ADMINISTRATION

DATA ADMINISTRATION ACTIVITIES POST DELIVERY

- **CONTINUED RESTORATION OF DATA SETS**
- **MISSION INTERFACE SUPPORT**
  - **SUPPORT DEVELOPMENT OF SFOC INTERFACE**
  - **PREPARE FOR INGESTION OF FLIGHT PROJECT DATA PRODUCTS**
    - PERFORM FEASIBILITY STUDIES FOR DETAILED LEVEL CATALOGS
    - DEVELOP DATA INGESTION PROCESS FOR FLIGHT PROJECTS

JPL

PDS SYSTEM DELIVERY REVIEW--PDS DATA ADMINISTRATION

DATA ADMINISTRATION ACTIVITIES POST DELIVERY

DATA DICTIONARY EVOLUTION

- **ENHANCE ACCESSIBILITY**
- **SUPPORT INTEGRATION OF DATA DICTIONARIES**

PDS System Delivery Review

Software Management Plans

D. Childs

February 16, 1990

PDS System Delivery Review

PDS Software Management Plans

Topics

- Software Management Plan (SMP) Document
- Completed Updates to the SMP
- Future Updates to the SMP

PDS System Delivery Review

PDS Software Management Plans – SMP Document

- The policies, procedures, and standards governing the management of the Version 1.0 software and procedures are contained in the SMP.

- The SMP contains the:
  - System Development Approach
  - Configuration Management Plan
  - Product Assurance Plan
  - Documentation Process
  - Development Standards
    - Software Development
    - User Interface
  - Applicability to Discipline Nodes

PDS System Delivery Review

PDS Software Management Plans – Completed Updates to the SMP

- Configuration Management Plan Updates
- Product Assurance Plan Updates
  - Revision of the Peer Code Walkthrough procedure and criteria
- Inclusion of the System Build Procedures
- Revision of the Software Development Standards
  - General Conventions
  - C
  - FORTRAN
- Revision of the User Interface Standards
  - General Conventions
  - Application Software User Interface
  - Transportable Application Executive (TAE) Interface

PDS System Delivery Review

PDS Software Management Plans – Future Updates to the SMP

- Distribute and review updates to the Configuration Management Plan
- Distribute and review updates to the Development Standards
- Review and update the Partially Integrated (PIN) software development process
- Restructure the document
- Factor out and "modularize" standards
- Republish the SMP and distribute

PDS System Delivery Review

Management Plans

T. Renfrow

February 16, 1990

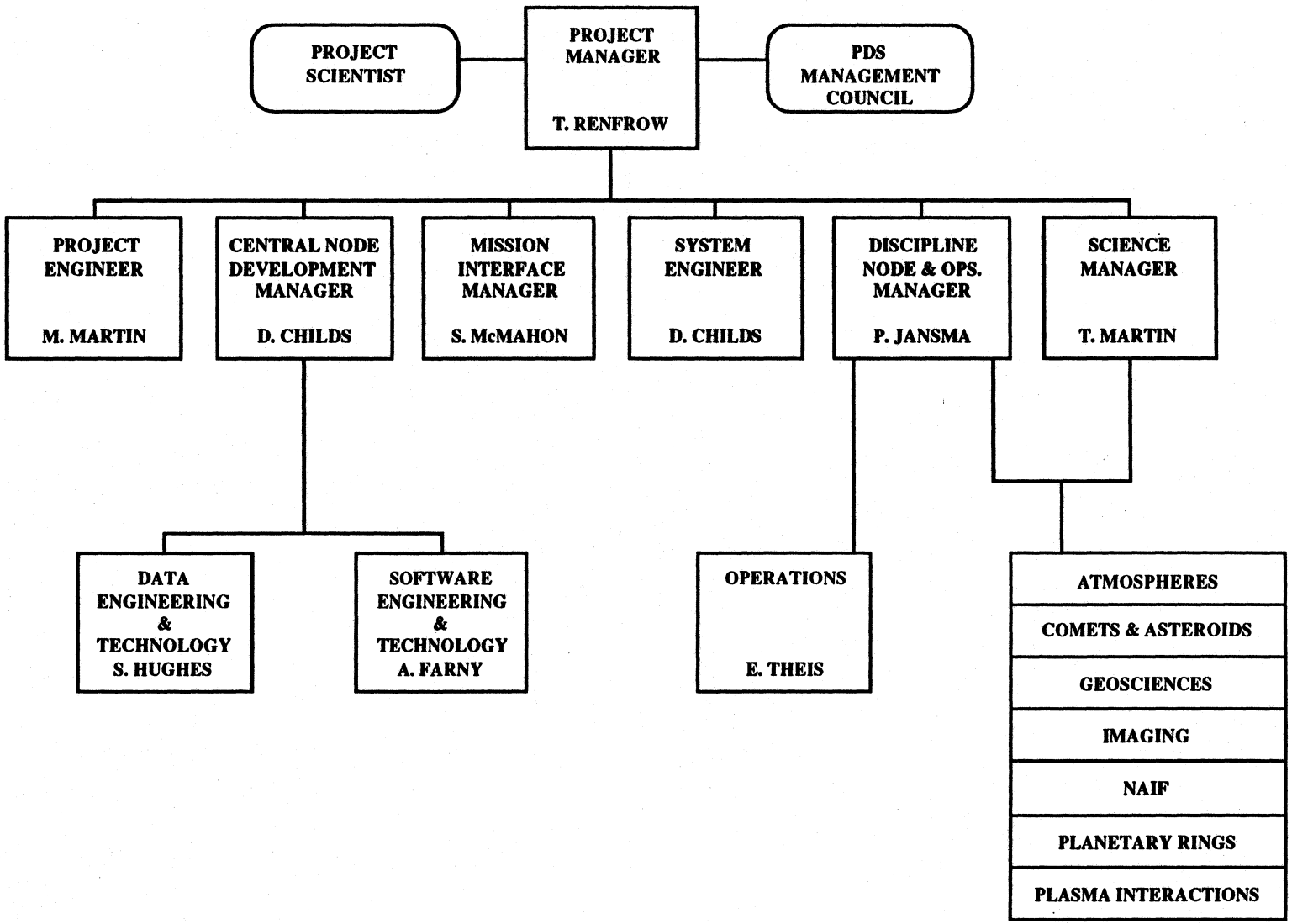
PDS System Delivery Review – Management Plans

Topics To Be Covered

- PDS Organization (Post Version 1.0)
- PDS Resources
- PDS Schedule (Post Version 1.0)
- Summary of WIP Approach and Development

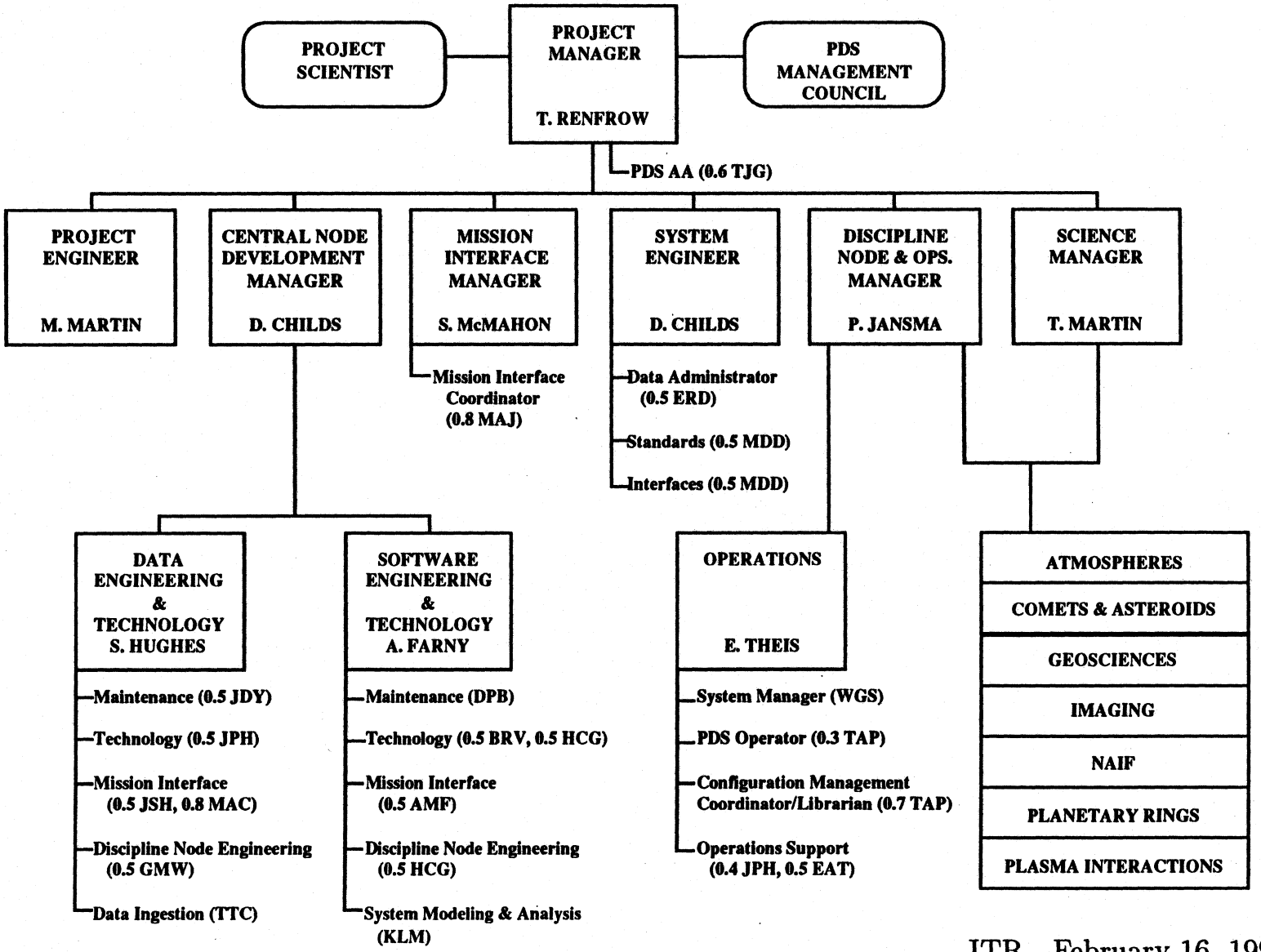
PDS System Delivery Review – Management Plans

PDS Organization (Post Version 1.0)



PDS System Delivery Review – Management Plans

PDS Resources



PDS System Delivery Review – Management Plans

PDS Schedule (Post Version 1.0)

- March, 1990
  - Delivery of Version 1.0.
  - Transition Plans completed.
  - Data set restoration list completed.
  - WIP completed.
- June, 1990
  - Data sets from Version 1.0 ingested.
  - PIN software integrated.
  - Mission interface relationships in place.
- September, 1990
  - Standards documents integrated and consistent.
  - CD-ROM production process well documented and widely used.
  - Data restoration activities in process for new data sets.
- December, 1990
  - Magellan data ingestion prototype completed.
  - Discipline Nodes completely integrated.
  - Schedule and plans for 1991 in place and 3 year goals and plans defined.

PDS System Delivery Review – Management Plans

Summary of WIP Approach and Development

- There will be one WIP produced to cover the entire PDS Project. There will be individual WIPs produced in the following project areas.
  - Management
  - Project Engineering
  - System Engineering
  - Mission Interface
  - Operations
  - Discipline Nodes
  - System Development

PDS System Delivery Review – Management Plans

Summary of WIP Approach and Development (Cont.)

- The following topics will be covered in the Project level WIP.
  - Management constraints
  - WBS
  - Project Organization
  - Project Level Role Statements
  - Deliverables and milestones
  - Summary schedule
  - Resources
  - Methodologies
  - Standards
  - Metrics for assessing and measuring progress and deliverables
- The following topics will be covered in each individual WIP.
  - Guidelines and constraints
  - WBS
  - Team Role Statements
  - Deliverables and milestones
  - Schedule
  - Major Tasks

PDS System Delivery Review – Management Plans

Summary of WIP Approach and Development (Cont.)

- A draft of the WIP was prepared in December.
- Planning meetings have been held in January and February.
- The Management Council will prioritize data sets for ingestion in March.
- The WIP will be released in early April.
- A project level status review will be held in April.

PDS System Delivery Review

Testing Approach and Results

D. Childs

February 16, 1990

PDS System Delivery Review

PDS Testing Approach

Topics

- Requirements Collection, Analysis, and Decomposition
- Summary of System Testing Approach
- Overview of System Integration and Testing
- Results of System Integration and Testing
- Overview of Acceptance Testing
- Results of Acceptance Testing

PDS System Delivery Review

PDS Testing Approach – Requirements Collection, Analysis, and Decomposition

- The user requirements were obtained from user interviews, user scenarios, prototyping, and documentation surveys. A high-level system specification was synthesized from analysis of user requirements.
- A *PDS User Requirements Document* was produced which was organized according the functional partitioning in the system specification.
- The Version 1.0 user requirements were decomposed into functional requirements and other functional requirements were derived. The *PDS Functional Requirements Document* was produced and reviewed at the Functional Requirements Review.
- A group of ECRs was proposed by the user community. Most of the ECRs were accepted by the CCB. These ECRs increased the scope of Version 1.0 significantly.
- A *PDS Functional Design Document* was produced which contained the functional design of the Version 1.0 system and the software requirements. A separate Software Requirements Document was not produced.
- The Version 1.0 development continued into the design phases and the functional requirements were decomposed and eventually mapped down to the unit level.

PDS System Delivery Review

PDS Testing Approach – Summary of System Testing Approach

- All subroutines, modules, units, and data components were tested at the unit level.
- All software components were reviewed at peer code walkthroughs.
- All software and data components were integrated and tested according to the *PDS System Integration and Test Plan* to verify that the functional requirements had been met.
- The integrated system was tested according to the *PDS Acceptance Test Plan* to verify that the original user requirements for Version 1.0 had been met.

PDS System Delivery Review

PDS Testing Approach – Overview of System Integration and Test

- PDS Incremental Releases
  - PDS Version Informal Incremental Release (IIR) System
  - PDS Version 1.0 System
- Versions of the SITP
  - PDS Version IIR System Integration and Test Plan
  - PDS Version 1.0 System Integration and Test Plan
- SITP Document Overview
  - Introduction
  - Overview of Integration and Test
  - System Builds
  - Test Requirements and Designs
  - Appendices – Inputs, Outputs, Test Procedures, Test Data Sheets, Test Analysis

PDS Testing Approach – Overview of System Integration and Test (Cont.)

- Integration and Test Strategy
  - Top Down
  - System Builds
    - Incremental Builds
    - System Builds
    - Subsystem Test Builds
- System Integration and Test Approach
  - Accepting Units for Integration
  - Integrating and Building the System
  - Conducting the Tests
  - Analyzing Test Results
  - Resolving Test Failures
  - Performing Regression Tests
  - Archiving the Test Results

PDS System Delivery Review

PDS Testing Approach – IIR Builds and Tests

- IIR Description
  - Consisted of a Subset of the Central Node User Interface Program
  - Consisted of the Access System CSCI and a Subset of the Inspect Data CSCI
- IIR Integration and Test Description
  - Consisted of 3 System Builds
  - Consisted of 10 Test Sets
  - Consisted of a Total of 22 Test Cases
- Provided Valuable Experience for Version 1.0 Integration and Test

PDS System Delivery Review

PDS Testing Approach – Version 1.0 Builds and Tests

- Incremental Build Description
  - Consists of the Central Node User Interface Program
  - Allows for Incremental Integration of Catalog Views and Associated Catalog Data
  - Supports the Peer Review Process
- Incremental Builds
  - IIR and Count Queries Incremental Build
  - Fields and Particles Incremental Build
  - Radiometry Incremental Build
  - Stored Commands Group 1B Incremental Build
  - Imaging Incremental Build
  - Atmospheres Incremental Build
  - Spectroscopy Incremental Build

PDS System Delivery Review

PDS Testing Approach – Version 1.0 Builds and Tests (Cont.)

- System Build 1
  - Central Node User Interface Program
  - Testbed Node User Interface Program
  - Access System CSCI
  - Access System TN CSCI
  - Inspect Data CSCI (Subset)
  - Inspect Data TN CSCI
  - PDSTEST Database (Not accessed)
- System Build 2
  - Catalog Loader Program
  - DBA Utility Program
  - Inspect Data CSCI (Remainder)
  - Administer Data CSCI
  - Administer Data TN CSCI
  - Prepare Data CSCI
  - Prepare Data TN CSCI
  - PDSTEST Database

PDS System Delivery Review

PDS Testing Approach – Version 1.0 Builds and Tests (Cont.)

- System Build 3
  - Order Data CSCI
  - PDSTEST Database
- System Build 4
  - Central Node Operator Interface Program
  - Distribute Data CSCI
  - Distribute Data TN CSCI
  - PDSTEST Database
- System Build 5
  - Administer System CSCI
  - Administer System TN CSCI
  - PDSTEST Database
  - PIN Software Packages
    - XGDATA/SPECIO System
    - IRPS System
    - F&P Browse System
    - PANDA System

PDS System Delivery Review

PDS Testing Approach – Version 1.0 Builds and Tests (Cont.)

- Subsystem Test Build 1
  - PDSCAT1 Database (Operational version)
- Subsystem Test Builds 2, 3, and 4
  - Optional Builds
  - Support Regression Testing
  - PDSCAT2 Database (Operational version)
- PIN Software Integration Approach
  - Configuration Inspection Test Case
  - Design Inspection Test Case
  - Installation Demonstration Test Case
  - User Guide Inspection Test Case
  - Central Node Connectivity Test Case
  - Acceptance Test Case

PDS Testing Results – System Integration and Test Results Summary

Build 1 Tests

Test Name	B1	B1.1	B2	B2.1	B3	B3.1	B4	B4.1	B4.3	B5	B5.1	SS1	SS2	SS3	SS4	SS5	n/a
Configuration Inspection	P	P															
Design Inspection	INC	INC	INC	P													
PDSTEST Logon	F	P															
Subprocess Initialization/ Termination	P	P															
Logon_TN	F	F	P			F	F	P									
CN MDF Execution	F	F	INC	INC	INC	INC	INC	INC	INC	INC	INC	P					
CN MDF Help	F	P															
F&P MDF Execution	INC	INC	F	F	P												
Atmospheres MDF Execution	INC	INC	INC	INC	INC	F	INC	P									
Radiometry MDF Execution	F	F	F	F	F	P											
Geoscience MDF Execution	F	F	F	F	F	F											

Build 2 Tests

Test Name	B1	B1.1	B2	B2.1	B3	B3.1	B4	B4.1	B4.3	B5	B5.1	SS1	SS2	SS3	SS4	SS5	n/a
Configuration Inspection			P	P													
Design Inspection			INC	P													
Command Line			F	F	P												
Parameter Screen			F	F	P												
Record Screen			P	P													
Table Screen			F	P													
Miscellaneous Retrieve Data			P	P		F	P										
Boundary Conditions			F	P													
Start SQL			F	P													
Miscellaneous Export Data			F	P													
Export Scenario 1			P	P				P									
Export Scenario 2			P	P				P									
Export Scenario 3			P	P				P									
Export Scenario 4			F	P				P									
Export Data to Terminal			P	P				P									
Order–Tagging			P	F	P												

P = Pass, F = Fail, and INC = Incomplete

PDS Testing Results – System Integration and Test Results Summary (Cont.)

Build 3 Tests

Test Name	B1	B1.1	B2	B2.1	B3	B3.1	B4	B4.1	B4.3	B5	B5.1	SS1	SS2	SS3	SS4	SS5	n/a
Configuration Inspection					P	P											
Design Inspection					F	P											
Order Data Command Line					F	F	P										
Profile Screen					F	P											
Order Scenario 1					P	P			P								
Order Scenario 2					P	P			P								
Order Scenario 3					F	P			P								
Confirm Screen					F	P					P				P	P	
Media Window					P	P					P						
Order Number Window					P	P											

Build 4 Tests

Test Name	B1	B1.1	B2	B2.1	B3	B3.1	B4	B4.1	B4.3	B5	B5.1	SS1	SS2	SS3	SS4	SS5	n/a
Configuration Inspection							P	P	P								
Design Inspection							INC	INC	F	P							
Checking Orders Manually							F	F	INC	F	F	P					
Acitivating Operators Order Interface							F	F	F	P							
CN/TN Inspection							INC	INC	INC	INC	INC	INC	P				
Catalog Feasibility Study							INC										
Data Set Submission Package							INC										
Enhance Catalog Schema							INC										
Generate Catalog Design Document							INC										
Maintain Meta Data							INC										
Release Data Set							INC										
Data Set Proposal							INC										
Testbed Node Archive							INC										
Tesbed Node Inventory							INC										
Peer Review							INC										
NSSDC Archive							INC										

P = Pass, F = Fail, and INC = Incomplete

PDS System Delivery Review

PDS Testing Results – System Integration and Test Results Summary (Cont.)

Build 5 Tests

Test Name	B1	B1.1	B2	B2.1	B3	B3.1	B4	B4.1	B4.3	B5	B5.1	SS1	SS2	SS3	SS4	SS5	n/a
Configuration Inspection										P	P						
Design Inspection										P	P						
O/I MDF Execution										F	P						
O/I MDF Help										F	F	F	F	INC	P		
O/I PDF Execution										F	INC	F	INC	INC	P		
O/I PDF Help										F	INC	F	INC	INC	F	F	P
Routing/Logging										P	P						
Update System Data										F	F	P					
Provide PDS Documentation										P	P						
Report Procedure										P	F	P					
Report Generation										P	F	P					
Operator Parameter Screen										F	P						
Fetch Data Screen										F	F	P					
CN/TN Inspection										INC	INC	INC	P				

Testbed Node Tests

Test Name	RAD XG-DATA	RAD SPECIO	IMAGE-UH	IMAGE-JPL	F&P-UCLA	ATMOS	NAIF	IMAGE-WU
PIN Configuration Inspection	P	P	n/a	n/a	P	INC	n/a	P
PIN Design Inspection	F	F	n/a	n/a	F	INC	n/a	P
Installation Demonstration	F	F	n/a	n/a	P	INC	n/a	P
User's Guide	F	F	n/a	n/a	P	F	n/a	P
CN Connectivity	P	P	n/a	n/a	P	P	n/a	P
Acceptance	F	F	n/a	n/a	P	INC	n/a	P
TN Demonstration (Distribute Data)	P	P	F	P	P	P	P	n/a
TN Demonstration (Administer System)	P	P	F	F	P	P	P	P

P = Pass, F = Fail, and INC = Incomplete

INC

PDS System Delivery Review

PDS Testing Results – System Integration and Test Results Summary (Cont.)

Subsystem Tests

Test Name	B1	B1.1	B2	B2.1	B3	B3.1	B4	B4.1	B4.3	B5	B5.1	SS1	SS2	SS3	SS4	SS5	n/a
Configuration Inspection												P	P	P	P	P	
Design Inspection												n/a	n/a	n/a	n/a	n/a	
CN MDF Execution												P					
CN MDF Help												P					
CN PDF Execution												F	F	F	P		
CN PDF Help												P	F	P	F	P	
Catalog View Execution												F	INC	P	P		
PDF Inspection												F	F	F	P		
Order Execution												F	INC	F	P		
Order Distribution												INC	INC	INC	F	P	
O/I MDF Execution												P	P	INC	P		
O/I PDF Execution												F	INC	INC	P	P	
O/I MDF Help												F	F	INC	P		
O/I PDF Help												F	INC	INC	F	F	P
Local Performance																	F
SPAN Performance																	n/a
Character Echo Time																	P
Catalog View Performance																	INC
Database Screen/Window																	P
Multiple Users																	F
New User Creation												INC	P				
Database Integrity												INC	INC	P			

P = Pass, F = Fail, and INC = Incomplete

PDS System Delivery Review

PDS Testing Approach – Overview of Acceptance Testing

- The original user requirements were reviewed, analyzed, and grouped into the following functional categories:
  - Access System and Inspect Data
  - Order Data and Distribute Data
  - Browse Data
  - Image Processing
  - Administer Data
  - Administer System
  - Operations
  - System Documentation
  - Requirements Met by Prior Qualification
  - Requirements Not Met
- The groups of user requirements were assigned to the Central Node System Development Teams, the Fields and Particles Node, and the Geosciences Node.

PDS System Delivery Review

PDS Testing Approach – Overview of Acceptance Testing (Cont.)

- The acceptance test cases were designed to:
  - Demonstrate that the Version 1.0 requirements had been met
  - Be performed by non-PDS personnel whenever possible
  - Be at a high-level in order to test the user documentation, the system help, and the system documentation
- The test cases were pre-tested by PDS personnel.
- The internal approach to Acceptance Testing was the same as for System Integration and Testing.
- The mapping from Version 1.0 user requirements to test cases was maintained.

PDS System Delivery Review

PDS Testing Approach – Example of Requirements Traceability Matrix

Requirements Traceability Matrix

User Requirement	Test Case
Browse–Contents–1	F&P Browse Test Case
Browse–Contents–2/Node	Browse Contents Test Case
Browse–Functionality	F&P Browse Test Case
Browse–Output	F&P Browse Test Case
Browse–Output–1/Node	Image Display Test Case
Browse–Output–2/Node	NOT MET
Bulk–Data–Transfer	Order and Distribute Test Case
Catalog–Function	F&P Scenario Test Case
Catalog–Location	F&P Scenario Test Case
Catalog–Updates	Catalog Updates Test Case
Charges	NOT MET
Configuration	Prior Qualification (See Development Tests)
Configuration–Management	Prior Qualification (See Development Tests)
Construct–Data–Summaries	SQL Test Case
Construct–Data–Tables	F&P Scenario Test Case
Data–Archive–1	Prior Qualification (See Development Tests)
Data–Archive–2	Data Archive Test Case
Data–Availability	Data Set Information Test Case
Data–Distribution–1	Data Distribution Test Case
Data–Formats–2	Prior Qualification (See Development Tests)
Data–Formats–3	NOT MET
Data–Integrity	Data Integrity Test Case
Data–Manipulation–1	SQL Test Case
Data–Order	Operations Plan Test Case
Data–Order–1	Order and Distribute Test Case
Data–Pointer–1	NOT MET

PDS System Delivery Review

PDS Testing Approach – Acceptance Test Results Summary

Test Name	Tester	Test Date	Results	PFR
Configuration Inspection Test Case	T. Panzer-Parr	10/20/89	FAIL	P172
Logon Test Case	H. Neilan	10/31/89	PASS	
Naïve User Test Case	T. Martin	10/26/89	FAIL	P187 P174
Fields and Particles Scenario Test Case	R. Walker	11/07/89	FAIL	P201
Data Set Information Test Case	R. Kahn	11/13/89	FAIL	P204
SQL Test Case	R. Walker	11/07/89	PASS	
Order and Distribute Test Case	T. Martin	11/26/89	FAIL	P174 P172 P205
Ordering from NSSDC Test Case	H. Neilan	11/01/89	FAIL	E044 P176 P175
Fields and Particles Browse Test Case	B. Kurth	10/31/89	FAIL	P207
Browse Contents Test Case	S. Petroy	11/15/89	PASS	
Image Display Test Case	S. Petroy	11/15/89	PASS	
Image Display Manipulation Test Case	S. Petroy	11/15/89	PASS	
Image Registration and Resampling Test Case	S. Petroy	11/15/89	PASS	
Catalog Updates Test Case	S. Braun	11/01/89	PASS	
Data Archive Test Case	R. Kahn	11/14/89	PASS	
Data Distribution Test Case	E. Fishbein	11/13/89	FAIL	P173,203
Data Integrity Test Case	J. Goguen	11/15/89	FAIL	P193 P173

N/A – Not Applicable, P/Q – Prior Qualification

PDS System Delivery Review

PDS Testing Approach – Acceptance Test Results Summary (Cont.)

Test Name	Tester	Test Date	Results	PFR
Data Pointer Test Case	S. Braun	11/30/89	PASS	
Data Quality Test Case	R. Kahn	11/14/89	FAIL	E051
File Protection Test Case	S. Braun	11/01/89	PASS	
Science Data Types Test Case	T. Martin	10/25/89	PASS	N/A
Restoration Funding Test Case	E. Fishbein	11/13/89	PASS	
Working Data Test Case	R. Walker	11/07/89	FAIL	P200 P204
Operator Scenario Test Case	T. Renfrow	11/28/89	PASS	
Operations Plan Test Case	T. Renfrow	11/28/89	FAIL	P202
Data Presentation Device Drivers Test Case	N/A	N/A	P/Q	
Data Rates Test Case	T. Renfrow	11/28/89	PASS	
Security Test Case	H. Neilan	11/01/89	PASS	
Dial–up Access Security Test Case	T. Martin	10/24/89	PASS	
Central Node Access Test Case	H. Nielan	11/01/89	PASS	P178
System Status Test Case	T. Martin	10/24/89	FAIL	P205
System Access Test Case	R. Walker	11/06/89	PASS	
System Level Accounting Test Case	T. Martin	10/24/89	PASS	
User's Guide Test Case	S. Lee	11/14/89	FAIL	P199
Software Operator's Manual Test Case	S. Braun	11/02/89	FAIL	N/A

N/A – Not Applicable, P/Q – Prior Qualification

PDS System Delivery Review

PDS Testing Approach – Acceptance Test Results Summary, Round Two

Acceptance Test Analysis Summary - Build 2

Test Name	Tester	Test Date	Results	PFR
Configuration Inspection Test Case	T. Panzer-Parr	02/13/90	PASS	
Naïve User Test Case	T. Charng	02/06/90	FAIL	
Order and Distribute Test Case	M. DeMore	02/05/90	PASS	
Ordering from NSSDC Test Case	T. Charng	02/06/90	FAIL	
Operations Plan Test Case	J. Verdugo	02/05/90	PASS	
System Status Test Case	M. DeMore	02/05/90	PASS	
User's Guide Test Case	H. Neilan	00/00/00	PENDING	
Software Operator's Manual Test Case	J. Verdugo	02/05/90	PASS	N/A

New Liens:

Integration tests for this build resulted in 1 new PFR.

Acceptance tests for this build resulted in 3 new PFR's.

PDS System Delivery Review

Version 1.0

Status and Summary

P. Jansma

February 16, 1990

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Topics To Be Covered

- PDS CDR AOC Resolution
- PDS ISR AOC Resolution
- Version 1.0 Final Sizing
- Status of Deliverable Products
- Status of PIN Software Packages
- Status of NIN Software Packages
- Release Description Document (RDD)
- Open Items
  - Outstanding Liens
  - Outstanding Engineering Change Requests (ECRs)
  - Outstanding Problem Failure Reports (PFRs)
  - User Requirements Not Met
- Version 1.0 Release Schedule

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS CDR AOC Resolution

- Resolutions have been written for all 52 AOCs from the PDS CDR. Two drafts of the PDS CDR AOC Resolution Report have been generated and distributed: one prior to the IIR and one four months after the IIR.

- While resolutions have been generated, not all actions defined have been carried out as yet on the following seven (7) AOCs:
  - AOCs 102, 119: Static performance modeling has not been included in the PDS SSD-1. Rationale – PDS does not have an adequate tool for performance testing and augmenting the hardware is not possible due to budget constraints. The majority of the PDS performance problems are caused by SPAN, over which the PDS does not have direct control.
  - AOC 103: The PDS CDD does not include a glossary of terms used in the document. Rationale – The PDS data dictionary contains definitions of all PDS data elements. A project-wide glossary will be developed as part of the on-going Mission Interface activities within the System Design Team context.
  - AOC 123: The PDS OP does not contain a procedure for referring large, expensive orders to the PDSMC for resolution. Rationale – This was not a requirement but could be incorporated into the operational procedures in the future. An ECR is being proposed which would address this need.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS CDR AOC Resolution (Cont.)

- Further action (Cont.)
  - AOC 129: Resource utilization for each module has not been included in the PDS SSD-1. Rationale – This has not been done due to budget and manpower constraints. There are approximately 600 modules to be analyzed. At 20 modules per day, this would require a person full-time for at least 6 weeks. An effort of this magnitude could not be supported by the current PDS resources. Also, significant prototype development would have shown any real problem areas.
  - AOC 143: Operational scenarios have not been designed and included in the PDS SSD-1. Rationale – Although some operational scenarios have been designed and will be presented at the PDS SDR, they were not available in time to include them in the PDS SSD-1. More will be designed as time permits.
  - AOC 147: The bulletin facility is not available to users. Passwords cannot be changed easily once they are created. Rationale – ECR 37 was written to address the lack of a bulletin facility. PFR 178 was written to address the problem with user passwords. These will be addressed as time and schedule permit.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS ISR AOC Resolution

- Within two weeks after the review, the 30 Areas of Concern (AOCs) raised at the PDS ISR were reviewed, categorized into four categories and nine (9) themes, and assigned to people for resolution.

- Resolutions have been written for all 30 AOCs from the PDS ISR. The PDS ISR AOC Resolution Report has been generated and distributed.

- While resolutions have been generated, not all actions defined have been carried out as yet on the following five (5) AOCs:
  - AOCs 213, 223: Static performance modeling has not been included in the PDS SSD-1. Rationale – PDS does not have an adequate tool for performance testing and augmenting the hardware is not possible due to budget constraints. The majority of the PDS performance problems are caused by SPAN, over which the PDS does not have direct control.
  - AOC 220: While various options for upgrading the hardware have been identified, no funds have been allocated for new hardware in FY90. Rationale – The budget for FY90 is very tight and many worthy and visible activities are competing for the limited resources.
  - AOC 224: Further consultation with NODS concerning operational procedures needs to take place. Rationale – The former NODS Operator worked on the PDS Operations Team for 10 months.

PDS ISR AOC Resolution

- Further action (Cont.)
  - AOC 229: The disk space for required Configuration Management should be defined in the PDS Operations Plan (OP). Rationale – The hardware configuration is given in Appendix A.7 of the PDS OP, along with the blocks necessary for execution.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Final Sizing

Topics to be Covered

- Software Components (Program Sets) Sizing
- Manual Procedures Sizing
- Catalog/Database Sizing
- PIN/NIN Software Packages Sizing
- Total System Size
- Analysis of System Size

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Final Sizing (Cont.)

Software Component (Program Sets) Sizing

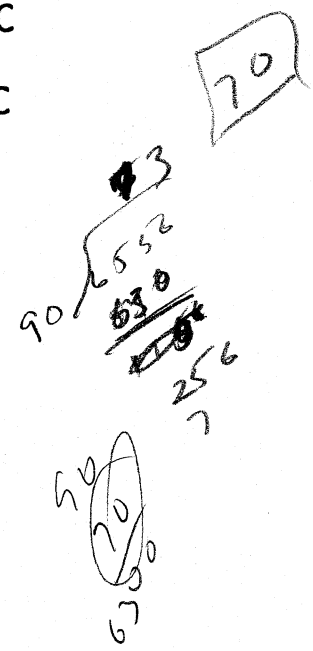
- Software components for the PDS Version 1.0 were generated using various computer languages and procured software packages.
  - C
  - FORTRAN and XIDL (for the PIN Software Packages)
  - Digital Control Language (DCL)
  - TAE Menu Definition Files (MDFs)
  - TAE Procedure/Process Definition Files (PDFs)
  - Structured Query Language (SQL)
- Values given reflect actual deliverable code.
- Values are given in deliverable source lines of code (DSLOC) and do not include comments.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Final Sizing (Cont.)

Software Component (Program Sets) Sizing (Cont.)

- The PDS consists of the following five program sets:
- Central Node User Interface (CNUSRIF) – 24,941 DSLOC
- Testbed Node User Interface (TNUSRIF) – 1,451 DSLOC
- Operator Interface (OPIF) – 8,226 DSLOC
- Catalog Loader (CATLDR) – 2,733 DSLOC
- SQL Stored Commands (DBA) – 6,556 DSLOC
- Total Central Node Program Set – 43,907 DSLOC



PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Final Sizing (Cont.)

Manual Procedures Sizing

- There are now 75 manual procedures identified in the PDS SSD-1 which support the following four functions:
  - Prepare Data – 15 procedures (10 for CN, 5 for TN)
  - Distribute Data – 10 procedures (4 for CN, 6 for TN)
  - Administer Data – 18 procedures (15 for CN, 3 for TN)
  - Administer System – 32 procedures (26 for CN, 6 for TN)
- The manual procedures are nominally one to two pages in length and their complexity varies widely.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Final Sizing (Cont.)

Catalog/Database Sizing
Database Structure Profile

- Number of Elements in the Data Dictionary – 574
- Number of Relations in the catalog – 167
- Number of Data Sets in initial Version 1.0 – 77
- Number of Megabytes of data in initial Version 1.0 – 100

PDS Version 1.0 Final Sizing (Cont.)

Catalog/Database Sizing (Cont.)
Lines of Code Profile

- Queries
  - Number of Science Queries – 90
  - Number of Science Count Queries – 90
  - Size of Average Science Query – 30 lines
  - Number of System Queries – 44
  - Size of Average System Query – 20 lines
  - Total – 6,556 DSLOC

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Final Sizing (Cont.)

PIN Software Packages Sizing

- Approximate sizes of the five PDS PIN Software Packages are:
  - F & P Browse – 19,000 DSLOC
  - IRPS – 16,000 DSLOC
  - PANDA – 26,000 DSLOC (not integrated in Version 1.0)
  - SPECIO – 5,000 DSLOC (not integrated in Version 1.0)
  - XGDATA – 11,000 DSLOC (not integrated in Version 1.0)
- Total PIN Software Packages
  - Approximately 35,000 DSLOC integrated into Version 1.0
  - Approximately 77,000 DSLOC actually implemented for Version 1.0

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Final Sizing (Cont.)

Total System Size

- Software Components
  - — Central Node Functions – 33,167 DSLOC
  - — Testbed Node Functions – 2,902 DSLOC
  - — Catalog/Database Functions – 9,289 DSLOC
- Total Size without PIN Software – Approximately 44,000 DSLOC
- Total Size with integrated PIN Software – Approximately 79,000 DSLOC
- Total Size with all PIN Software – Approximately 121,000 DSLOC
- Total Size with PIN and NIN Software – Approximately 141,000 DSLOC

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Final Sizing (Cont.)

Analysis of System Size

- Total system size without PIN Software had been estimated at 18,750 DSLOC at the Preliminary Design Review (PDR).
- Total system size without PIN Software had been estimated at 15,350 DSLOC at the Critical Design Review (CDR).
- Total system size without PIN Software had been estimated at 45,000 DSLOC at the Implementation Status Review (ISR).
- Total system size without PIN Software is actually 44,000 DSLOC at the System Delivery Review (SDR).
- Total number of manual procedures had been estimated at 49 at the Critical Design Review (CDR).
- Total number of manual procedures had been estimated at 124 at the Implementation Status Review (ISR).
- Total number of manual procedures is actually 75 at the System Delivery Review (SDR).

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Final Sizing (Cont.)

Analysis of System Size (Cont.)

- Factors affecting the change in software scope:
  - The Inspect Data function was 2.5 times larger than originally expected.
  - The Order Data function was 3 times larger than originally expected.
  - The Administer Data function was 3 times larger than originally expected.
    - Some manual functions were automated.
    - The size of the DBA utilities was underestimated.
  - The Administer System function was 4 times larger than originally expected.
    - Some manual functions were automated. Several manual procedures were combined.
  - The stored commands were 6 times larger than originally expected.
    - Each science query needed a corresponding count query.
    - The average size of a query was underestimated: 15 instead of 30 lines.
    - The implementation of 20 science queries and their corresponding count queries is being postponed until later.
  - The need for some changes became obvious following the IIR.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Status of Deliverable Products

- There are 16 Deliverable Documents for the PDS Version 1.0. An overview of the contents of each document is given in Section 3.3.3 of the PDS Software Management Plan.

- The documents, grouped according to type, are listed below.
  - Requirements
    - PDS User Requirements Document (URD)
    - PDS Functional Requirements Document (FRD)
  - Plans
    - PDS Task Implementation Plan (TIP)
    - PDS Software Management Plan (SMP)
    - PDS System Integration and Test Plan (SITP)
    - PDS Acceptance Test Plan (ATP)
    - PDS Operations Plan (OP)
    - PDS Data Administration Plan (DAP)

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Status of Deliverable Products (Cont.)

- Deliverable Documents (Cont.)
  - Design Specifications
    - PDS Functional Design Document (FDD)
    - PDS Catalog Design Document (CDD)
    - PDS Software Specification Documents (SSD–1, SSD–2)
    - PDS Software Interface Specifications (SIS)
  - Guides
    - PDS User's Guide (UG)
    - PDS Software Operator's Manual (SOM)
  - Miscellaneous
    - PDS Release Description Document (RDD)

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Status of Deliverable Products (Cont.)

Document Status

- Seven documents are completed and signed–off (TIP, URD, FRD, FDD, CDD, DAP, OP).
- Seven documents are completed and in the signature cycle (UG, SOM, SSD–1, SIS, SITP, ATP, RDD)
- One previously signed–off document is being revised for use in future development efforts (SMP).
- One document is still being written (SSD–2).
  - An automated code parser has been developed, and is being used to assist in the generation of this document.
- Documentation is approximately 90 percent complete now.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Deliverable Products (Cont.)

Document Name	Version	Release Date	Current Pages	Estimated Pages
URD	0.4	10/21/86	94	100
FRD	2.0	12/31/86	280	300
TIP	1.0	05/07/87	147	100
SMP	2.2	02/19/90	211	150
SITP	1.5	01/17/90	420	400
ATP	2.0	02/06/90	191	150
OP	2.0	02/06/90	134	100
DAP	2.0	02/07/90	198	200
FDD	2.0	01/18/88	284	300
CDD	2.0	02/09/90	463	400
SSD–1	2.0	02/14/90	1300	1000
SSD–2	–	–	0	1000
SIS	1.14	12/14/89	265	80

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Deliverable Products (Cont.)

Document Name	Version	Release Date	Current Pages	Estimated Pages
UG	2.0	01/31/90	410	300
SOM	2.0	01/31/90	277	150
RDD	1.0	02/07/90	70	10
TOTAL			4744	4740

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Status of PIN Software Packages

Topics To Be Covered

- Definition of Partially-Integrated (PIN) Software Classification
- Overview of five PDS PIN Software Packages
- PDS PIN SRR Report
- PDS PIN SDR Report
- PDS PIN SAR Report
- PDS PIN Software Integration Testing
- Status of PDS PIN Software
  - Implementation Status
  - Deliverable Source Lines of Code
  - Areas of Concern
  - Documentation Status

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Categories of Software

- Three categories of software exist for Version 1.0:
  - Fully-Integrated (FIN) Software
  - Partially-Integrated (PIN) Software
  - Non-Integrated (NIN) Software

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Definition of PIN Software Classification

- Definition– all approved software that is being developed or has been developed by the Integrated Science Testbed Nodes for PDS Version 1.0 that is NOT part of the Core Version 1.0 functionality, but which is intended for integration with the PDS.
- Original Examples – XGDATA, SPECIO, TAE Menus and Procs used to provide access to catalogs and science databases at the Integrated Science Testbed Nodes, DBMS implementation software, Image Workstation software, F & P Browse capability, etc.
- Software Class – Class 3
- Deliverable Documents Required – Four Class 3 documents (SRD, SSD, UG/SOM, ATP) as specified in the PDS SMP; Documents may cover a suite of programs, menus or procedures which comprise a functional unit.
- Reviews Required – Three Class 3 Reviews (Requirements (SRR), Design (SDR), Acceptance (SAR)) as specified in the PDS SMP.
- Review Board Personnel – Informal Review Board consisting of PDS Project personnel (CCB members, Science Node Managers)

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Definition of PIN Software Classification (Cont.)

- Level of Standards Required – user interface, data management, software coding
- Represented in PDS Documents – Functional Design Document (FDD), Software Interface Specifications (SISs)
- Represented in PDS Reviews – Preliminary Design Review (PDR), Critical Design Review (CDR)

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Definition of PIN Software Classification (Cont.)

PIN Software Deliverable Documents and Reviews

- Deliverable Documents
  - Software Requirements Document (SRD)
  - Software Specification Document (SSD)
  - User's Guide (UG)
  - Acceptance Test Plan (ATP)
- Formal Reviews
  - PIN Software Requirements Review (SRR), August 24 – 25, 1987
    - Review the SRD
  - PIN Software Design Review (SDR), March 28 – 29, 1988
    - Review the SSD and Preliminary UG
  - PIN Software Acceptance Review (SAR), February 27 – 28, March 1, 1989
    - Review the final SSD, UG, ATP and code
- Testing
  - Unit testing and pre-acceptance testing by developers at the node, March 1 – April 30, 1989
  - Integration testing by Central Node personnel, May 1 – July 31, 1989

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Overview of PDS PIN Software Packages

- Five PDS PIN Software packages were included in PDS Version 1.0 as a result of the approval of ECR # 10.
- The names of each of the PIN packages and the institutions developing them are given below:
  - RPIF Image Retrieval and Processing System (IRPS), Washington University (St. Louis, MO)
  - XGDATA Retrieval and Analysis System, UGSG (Flagstaff, AZ)
  - Fields and Particles Browse System, UCLA (Los Angeles, CA)
  - SPECIO Retrieval and Display System, USGS (Flagstaff, AZ)
  - Prototype Atmospheres Node Data Access (PANDA) System, LASP, University of Colorado (Boulder, CO)

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Overview of PDS PIN Software Packages (Cont.)

Fields and Particles Browse System

- Dr. Ray Walker of UCLA is the Node Manager for the Planetary Plasma Interactions (PPI) Node, formerly the Prototype Fields and Particles (F & P) Node.
- Provides a data access system for planetary plasma (fields and particles) data
  - Magnetometer (MAG) Data
  - Low-Energy Charged Particle (LECP) Data
  - Plasma Wave Science (PWS) Data
  - Plasma Science (PLS) Data
- Provides magnetospheric scientists with access to a detailed- level catalog for fields and particles data
- Provides an on-line browse capability for fields and particles data
- Provides simple graphics displays for examining browse data

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Overview of PDS PIN Software Packages (Cont.)

Fields and Particles Browse System (Cont.)

- Concentrates on data sets from outer planets
  - Voyager 1 and Voyager 2 Jupiter data
  - Voyager 1 and Voyager 2 Saturn data
  - Voyager 2 Uranus data
- The Browse System is approximately 19,000 Deliverable Source Lines of Code without comments, and approximately 35,000 lines with comments.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Overview of PDS PIN Software Packages (Cont.)

RPIF Image Retrieval and Processing System

- Dr. Ray Arvidson of Washington University (WASHU) is the Node Manager for the Planetary Geosciences Node. This package was developed at WASHU when it was formerly the Prototype Imaging Node.
- Provides access to a large database of information about planetary exploration and image data sets
- Provides information about planets, satellites, planetary missions, spacecraft, imaging instruments and image data products in its General Information Catalog
- Provides information about images, mosaics and maps in its Data Catalog as well as pointers to the locations of EDR image data on magnetic tape or CDROM.
- Provides an interface to an image analysis software package for calibration, processing and display of digital image data
- The IRPS System is approximately 16,000 Deliverable Source Lines of Code without comments.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Overview of PDS PIN Software Packages (Cont.)

Prototype Atmospheres Node Data Access System

- Dr. Steve Lee of LASP is the Node Manager for the Planetary Atmospheres Node, and was formerly the Science Manager for the Prototype Atmospheres Node.
- Provides a data access system for planetary atmospheres data
- Provides data manipulation via the Interactive Data Language (XIDL) e.g. arithmetic functions, Fourier transforms, binning, applying offsets, etc.
- Provides a plotting capability, including surface plots and countour plots.
- Contains data sets related to the study of the Martian atmosphere and surface, and data from Jupiter, Saturn and Uranus
  - Viking Orbiter and Mariner 9 cloud catalog
  - Viking Orbiter IRTM and MAWD
  - Viking Lander Meteorology Experiment
  - Voyager IRIS, UVS, and PPS
- System is approximately 26,000 Deliverable Source Lines of Code without comments, and 44,000 lines with comments.

Overview of PDS PIN Software Packages (Cont.)

XGDATA Retrieval and Analysis System

- Dr. Hugh Kieffer of the USGS Astrogeology Branch was the Node Manager for the Prototype Radiometry Node where this package was originally developed. This package will now be incorporated into the Planetary Geosciences Node at the Washington University.
- Provides access and basic analysis to radiometer and spectral channel observations
- Provides mapping of observation locations in several projections and binning of data
- Provides access to a directory which contains the range of geometry parameters for each sequence
- Contains the following data sets
  - Viking 1 and 2 IRTM
  - Mariner 9 IRR
  - Viking 1 and 2 MAWD
- System is approximately 11,000 Deliverable Source Lines of Code (without comments)

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Overview of PDS PIN Software Packages (Cont.)

SPECIO Retrieval and Display System

- Dr. Hugh Kieffer of the USGS Astrogeology Branch was the Node Manager for the Prototype Radiometry Node where this package was originally developed. This package will now be incorporated into the Planetary Geosciences Node at the Washington University.
- Provides access and basic display functions for spectral data
- Provides constraining of data acccording to geometric or spectral parameters
- Generates spectral plots and provides spectral filtering
- Contains the following data sets
  - Mariner 9 IRIS
  - Voyager 1 and 2 IRIS
  - Mariner 6 and 7 IRS
- System is approximately 5,000 Deliverable Source Lines of Code (without comments).

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS PIN SRR Report

- The Software Requirements Review (SRR) for the five PIN Software packages was held on Aug. 24-25, 1987 at the United States Geological Survey (USGS) in Flagstaff, AZ.
- The PIN SRR Review Report identifying both general and node- specific Areas of Concern (AOCs) was issued on October, 2, 1987.
- The PIN SRR AOC Resolution Report was issued on Mar. 23, 1988.
- The PIN SRDs were revised and published in Dec. 1987.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS PIN SDR Report

- The PIN Software Design Review (SDR) was held on Mar. 28-29, 1988 at the Laboratory for Atmospheric and Space Physics (LASP) at the Univ. of Colorado at Boulder.
- The PIN SDR Review Report identifying both general and node- specific Areas of Concern (AOCs) was issued on May, 2, 1988.
- The PIN SDR AOC Resolution Report was issued on June 24, 1988.
- With the exception of the PANDA System, revisions to the PIN SSDs and UGs were released in Feb. 1989.
- Updated versions of the UGs and SSD were published in late April 1989. Final versions of most of the SSDs were published in June 1989.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS PIN SAR Report

- The PIN Software Acceptance Review (SAR) was held on Feb. 27-28, Mar. 1, 1989 at JPL.
- The PIN SAR Review Report identifying both general and node- specific Areas of Concern (AOCs) was issued on Mar. 24, 1989.
- The final PIN SAR AOC Resolution Report has not been published.
- All PIN Software developers prepared an Acceptance Test Plan (ATP) for the PDS PIN SAR. These ATPs are being revised based on feedback received at the review. In addition, all but the PANDA System updated their SSDs and UGs.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS PIN SAR Report (Cont.)

- While the PIN SAR was a meaningful review, none of the five PDS PIN Software packages was ready for actual acceptance in February 1989.
  - Bugs needed to be fixed.
  - Additional tests needed to be generated and conducted.
  - The documentation (ATP, UG, SSD) needed to be revised based on reviewer's comments.
  - The internal code headers/comments needed to be upgraded to meet the PDS coding standards.
  - In some cases, the remaining functionality needed to be implemented.
  - Some PIN software developers also generated separate Installation Guides. Others included installation procedures in their User's Guides.
- Resolutions to all package-specific Areas of Concern (except for SPECIO) have been submitted. Draft resolutions to four of the eight General Areas of Concern have been submitted.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS PIN Software Integration Testing

- The five PDS PIN Software packages were scheduled for a phased integration with the PDS beginning on May 2, 1989 and continuing through July 31, 1989.
  - An average of two weeks per package was allocated for integration.
  - The order of integration was as follows: SPECIO, XGDATA, IRPS, F&P BROWSE, PANDA.
  - The Testbed Node User Interface (TNUSRIF) shell was installed and tested at all four nodes which developed PIN software (USGS, WASHU, UCLA, and LASP)
  - Six test cases were performed for each package:
    - Configuration Inspection Test Case
    - Design Inspection Test Case
    - Installation Demonstration Test Case
    - User's Guide Test Case
    - Central Node Connectivity Test Case
    - Acceptance Test Case
  - A memo documenting the test results was written for each PIN software package. August 14 was established as the final date for resolving anomalies or liens.

PDS PIN Software Integration Testing (Cont.)

- Test Results
  - The IRPS and F & P Browse systems passed their integration testing with some anomalies and liens. These liens have since been resolved.
  - The XGDATA and SPECIO systems did not pass their integration testing, and a significant number of test anomalies was found. Testing was suspended due to resource constraints. Some work has been done to resolve the SPECIO anomalies. Many XGDATA anomalies are still pending.
  - Testing of the PANDA system was not completed since the package was not ready at the allocated time in July 1989. The PANDA SSD has since been updated in January 1990. Work on the PANDA ATP and Installation Guide will be complete at the end of February 1990. Work on the PANDA UG will be complete by mid-March 1990.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS PIN Software Status

- The five PIN Software packages total approximately 77,000 lines of code without comments. The size including comments is over 130,000 lines.
- A review of the PIN Software development process will occur in March 1990. At that time, the PDS Project approach to PIN software development in the future will be reassessed.
- Issues and Concerns:
  - The schedule for integrating the PIN software packages was very tight.
  - The Central Node wanted to freeze the software at the time of integration. The PIN software developers wanted to continue testing, invite more user feedback, and make additional changes. These types of changes should be handled by ECRs.
  - The integration of the SPECIO and XGDATA packages at the Prototype Radiometry Node was unsuccessful. These packages now need to be incorporated by the new Planetary Geosciences Node.
  - The PANDA system is not scheduled for integration until April 1990.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Status of Non-Integrated (NIN) Software Packages

Topics To Be Covered

- Definition of Non-Integrated (NIN) Software Classification
- Overview of two NIN Software Packages
- Status of NIN Software

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Non-Integrated (NIN) Software

Definition of NIN Software Classification

- Definition – all approved software that has been developed or acquired by the PDS Integrated Science Testbed Nodes for use in the access, analysis or manipulation of a specific science dataset.
- Original Examples – dataset-specific analysis routines written in FORTRAN, XIDL or TEMPLATE; I/O drivers for accessing datasets from tape, disk or CDROM; data manipulation routines
- Software Class – unclassed (Pseudo-Class 4)
- Deliverable Documents Required – Two Class 4 documents (SSD, UG/SOM) as specified in the PDS SMP.
- Reviews Required – one Peer Review prior to acceptance and inclusion in the PDS database as specified in the PDS SMP.
- Review Board Personnel – Informal Review Board consisting of PDS Project personnel (CCB members, Science Node Managers)

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Non-Integrated (NIN) Software

Definition of NIN Software Classification (Cont.)

- Level of Standards Required – data interchange, software coding
- Represented in PDS Documents – not applicable
- Represented in PDS Reviews – not applicable

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Non-Integrated (NIN) Software

Definition of NIN Software Classification (Cont.)
NIN Software Deliverable Documents and Reviews

- Deliverable Documents
  - Software Specification Document (SSD)
  - User's Guide/Software Operator's Manual (UG/SOM)
- Formal Reviews
  - Software Acceptance Review (SAR), Mar. 1, 1989

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Non-Integrated (NIN) Software

Overview of PDS NIN Software Packages

- Two PDS NIN Software packages were included in PDS Version 1.0 as a result of the approval of ECRs #20 and #21.
- The names of both of the NIN packages and the institutions developing them are given below:
  - SPICELIB 'NAIF Toolkit', JPL (Pasadena, CA)
  - Prototype Spectrum Database Management System (PSDMS), Univ. of Hawaii (Honolulu, HI)

Non-Integrated (NIN) Software

Overview of PDS NIN Software Packages (Cont.)
SPICELIB 'NAIF Toolkit'

- Chuck Acton is the Task Manager of the Navigation Ancillary Information Facility (NAIF).
- SPICELIB, an observation geometry software 'toolkit', contains a library of portable software modules needed to:
  - Read the SPICE kernels
    - S = Spacecraft ephemeris
    - P = Planet or satellite ephemerides
    - I = Instrument description kernel
    - C = Pointing kernel
    - E = Events kernel
  - Manipulate the SPICE kernels
  - Calculate most common observation geometry parameters e.g. phase angle, longitude, latitude, range, etc.
- The NAIF Toolkit consists of approximately 400 modules and 20,000 lines of code.

Non-Integrated (NIN) Software

Overview of PDS NIN Software Packages (Cont.)
Prototype Spectrum Database Management System (PSDMS)

- Dr. Tom McCord was the Manager of the Prototype Reflectance Spectroscopy Sub-Node.
- Provides a database management system for laboratory, telescope, and spacecraft spectrum data sets
- Provides the capability to constrain the data according to target, subarea, mineral, sampling parameters, telescope name, instrument name, publication date or author name
- Provides display of selected spectra in graphical format

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Non-Integrated (NIN) Software

Overview of PDS NIN Software Packages (Cont.)
Prototype Spectrum Database Management System (PSDMS) (Cont.)

- Contains the following data sets
  - 26-color survey asteroid spectra
  - 8-color survey asteroid data
  - Sample lunar spectra
  - Sample sets of Mars spectra
  - Sample sets of outer satellite spectra
  - Sample sets of ice/mineral mixtures spectra
  - Sample basaltic mineral mixtures spectra
  - Thermal reflectance and transmission spectra of pure minerals

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Non-Integrated (NIN) Software

PDS NIN Software Status

- Prototypes of the NIN Software packages exist and are currently being modified and documented.
- NAIF participated in the DPS Demo in Nov. 1987.
- The NIN Software Acceptance Review (SAR) was conducted on Mar. 1, 1989.
  - Only NAIF participated in the NIN review. The NAIF Toolkit was approved for acceptance into the PDS with no liens.
  - The PSDMS was not ready for review at that time due to contractual difficulties. No new funding will be available to continue development of the PSDMS. Therefore, an ECR should be written to remove this functionality from the PDS Version 1.0.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Release Description Document (RDD)

- The PDS Release Description Document (RDD) describes the following aspects of the PDS Version 1.0 system:
  - Program Resource Requirements
  - Operational Guidelines
  - Operational Constraints
  - Deliverable Documents
  - Deliverable Data Sets
  - Deliverable Source Code
  - Deliverable Executables
  - Open ECRs/PFRs
  - Closed ECRs/PFRs
  - Waivers

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Open Items

Outstanding Liens

- 25 liens are recorded against Version 1.0
- 12 liens were identified during System Integration Testing and are all data related.
  - These liens are against procedures which are now in place. However, formal walkthroughs have not been conducted and the results have not been documented in the PDS SITP.
  - These liens will be worked off on a best effort basis as schedule, manpower, and budget allow.
- 13 liens were identified during Acceptance Testing.
  - 5 liens are software related.
  - 4 liens are data related.
  - 4 liens are of an administrative nature (i.e. documentation, schedule, etc.)
- These liens are addressed by 18 PFRs and 1 ECR.
  - The total impact of this work is 29 work days.
  - 12 work days have been utilized already against these liens.
- All liens have been incorporated into an ECR or a PFR, and have been placed in a queue for implementation.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Open Items (Cont.)

Outstanding ECRs

- 54 ECRs have been written against PDS Version 1.0.
  - 39 ECRs have been closed.
  - 15 ECRs are in various stages of resolution.
- The open ECRs have been categorized as critical, important or nice.
  - 3 ECRs are considered critical, and require approximately 65 work days to implement (1 is still of unknown impact).
  - 5 ECRs are considered important, and require approximately 20 work days to implement.
  - 3 ECRs are considered nice, and require approximately 15 work days to implement.
  - 4 ECRs are still undergoing impact analysis.
  - It will require a minimum of 100 work days to close out the current open ECRs.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Open Items (Cont.)

Outstanding PFRs

- 215 PFRs have been written against PDS Version 1.0.
  - 187 PFRs have been closed.
    - This work required 737 file modifications, and consumed 87 work days.
  - 28 PFRs are in various stages of resolution.
    - 11 PFRs are considered critical, and require approximately 17 work days to implement.
    - 12 PFRs are considered important, and require approximately 10 work days to implement.
    - 5 PFRs are considered nice, and require approximately 15 work days to implement.
    - This will require a minimum of 46 work days to close out the current open PFRs.
  - 18 PFRs are directly related to liens against the system. (Reference the slide re. liens.)

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Open Items (Cont.)

User Requirements Not Met

- 15 of the 103 User Requirements documented in the PDS URD were not met by PDS Version 1.0.
- 11 of the 103 User Requirements were only partially met by PDS Version 1.0.
- These requirements are under analysis by the system engineering team, and will be divided into two categories:
  - Those requirements which are no longer considered relevant, and are recommended for removal from system by the ECR process (currently 13 requirements).
  - Those requirements which are still relevant,but which will be considered part of the PDS Version 2.0 (currently 13 requirements).

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Open Items (Cont.)

User Requirements Not Met (Cont.)

- Requirements which are considered no longer relevant.
  - — Long distance charges will not be charged to the user.
  - — The Central Node shall be a permanent data archive.
  - — There shall be a standard intermediate data format.
  - — All data shall be distributed from the Central Node.
  - — The PDS Project Manager shall handle all documentation.
  - — System maintenance shall be performed weekly.
  - — PDS shall have internodal processing capabilities.
  - — Data communications shall have a priority structure.
  - — PDS shall have an averaging capability for science data.
  - — Major data requests shall always be rechecked with the user.
  - — A two month system schedule shall be on–line.
  - — PDS shall present a uniform appearance to the user. ——> needs to be moved to version 2.0

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Open Items (Cont.)

User Requirements Not Met (Cont.)

- Requirements which are under consideration for Version 2.
  - Browse shall make contour plots, zoom and control contrast.
  - Browse shall provide a variety of coverage plots.
  - The DBMS shall contain a unique identifier for each observation.
  - The user shall be informed of system failures, and allowed to abort his request.
  - PDS shall have color plotting, and mesh display capabilities.
  - PDS graphics shall have an intensity calibration bar.
  - PDS graphics shall have 2 and 3 dimension presentation capability.
  - PDS graphics shall have perspective and surface plot capabilities.
  - PDS shall have a 2–3 second response time.
  - PDS shall accumulate a system-wide software library.
  - PDS shall have a heavy use and preventative maintenance schedule.
  - PDS shall provide user training classes.
  - PDS shall provide on–line training.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

PDS Version 1.0 Open Items (Cont.)

Conclusions

- Tasks totaling 146 work days due to ECRs and PFRs have been placed in a queue for maintenance activities for PDS Version 1.0.
- 153 work days have been allocated for maintenance activities during FY90.
- Plans have been made to resolve the requirements not met by utilizing the ECR process, and postponing some functionality until Version 2.0.

PDS System Delivery Review (SDR) – Version 1.0 Status and Summary

Version 1.0 Release Schedule

JPL Jet Propulsion Laboratory

APPROVAL: _____ J. T. Renfrow

ACHIEVEMENT: _____ P. A. Jansma

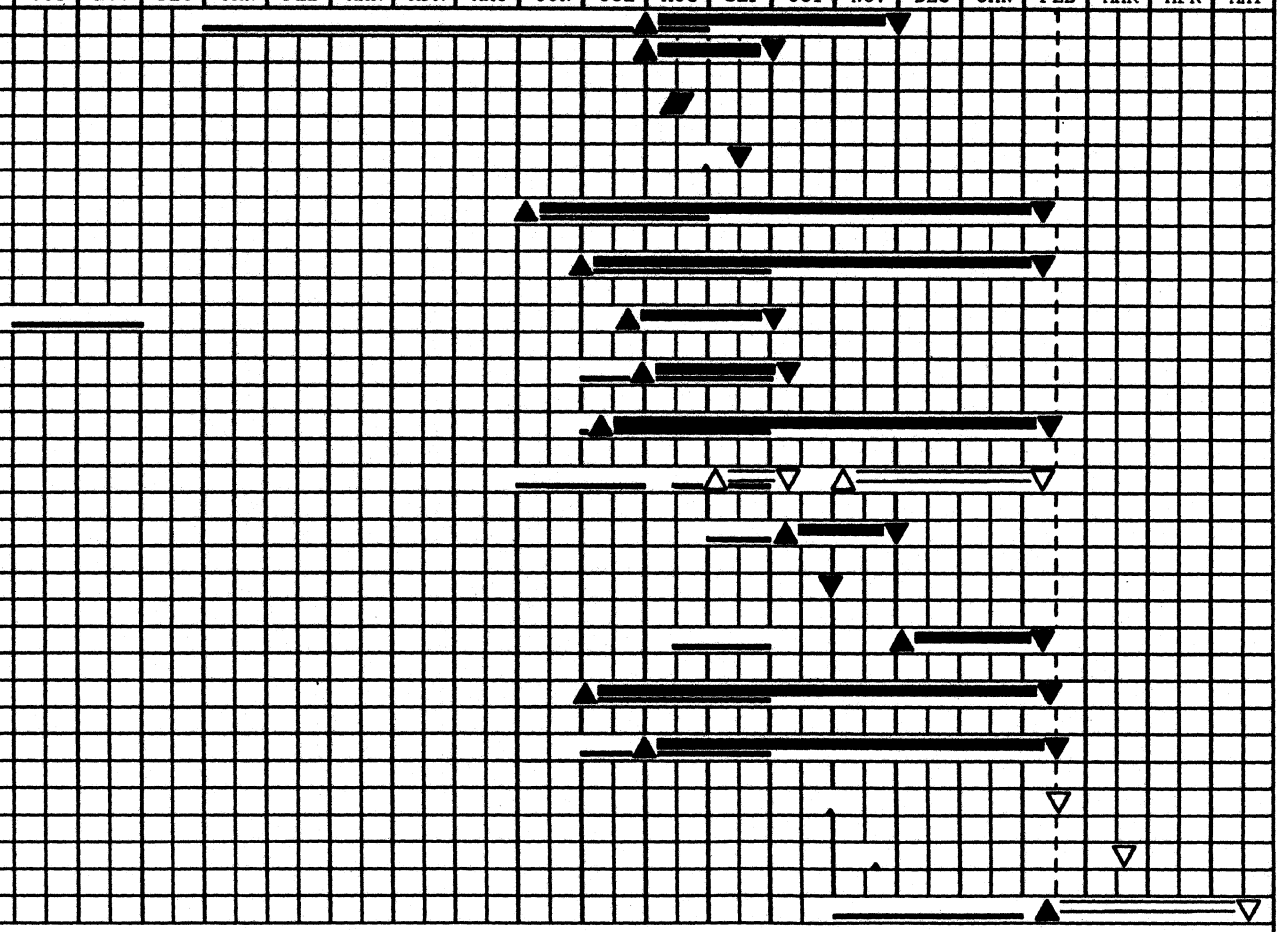
Planetary Data System

Version 1.0 Development

System Test/Acceptance Test Phase

STATUS AS OF: 02-15-90
REV C, DATE: 07-26-89
CREATION DATE: 06-24-88

	ACTIVITY
1	System Test/Acceptance Test Phase
2	Subsystem Testing
3	Soviet Phobos Workshop
4	Data Sets Archived at NSSDC
5	Final User's Guide (UG)
6	Final S/W Operator's Manual (SOM)
7	Final Sys.Int.&Test Plan (SITP)
8	Final OPS Plan (OP)
9	Final Data Admin. Plan (DAP)
10	Final Acceptance Test Plan (ATP)
11	Conduct Acceptance Test
12	1989 DPS Demo
13	Release Desc. Document (RDD)
14	Final Catalog Design Doc. (CDD)
15	Final S/W Spec. Document (SSD-1)
16	System Delivery Review (SDR)
17	PDS Version 1.0 System Delivery
18	Software Spec. Document (SSD-2)



PDS System Delivery Review

Issues and Concerns

T. Renfrow

February 16, 1990

PDS System Delivery Review – Issues and Concerns

Issues and Concerns

- Functionality
  - Only two of the five PIN Software Packages were actually integrated into the PDS Version 1.0.
  - The NIN software package from the Univ. of HI, PSDMS, was not ready as planned and will not be part of the PDS Version 1.0.
  - The PDS Version 1.0 catalogs and some documents need to be immediately updated to reflect the new Discipline Nodes (DNs) and not the Integrated Science Testbed Nodes (ISTNs).
  - The user interface lacks commonality among the Central Node system and the various PIN Software packages.
  - Many of the PDS Version 2.0 requirements crept into the PDS Version 1.0 over the development life cycle!
- Software Maintenance
  - A serious anomaly with the Order Data function was detected during Acceptance Testing. Work to correct this problem is still being completed.
  - There is a substantial backlog of open ECRs, PFRs, and wish list items which could/should be incorporated into the PDS. There is only one man-year allocated to Version 1.0 maintenance in FY90.

PDS System Delivery Review – Issues and Concerns

Issues and Concerns (Cont.)

- Performance
  - Poor SPAN performance has continually plagued the PDS making system response appear intolerable at times.
  - PDS Version 1.0 did not meet its response time requirements.
- Operations
  - A phased approach to adding new users is necessary due to staffing limitations in the PDS Operations Team.
  - Limited funds are available to fund the PDS Operator position.
  - More coordination work must be done with the Discipline Nodes to adequately prepare them for the Operations Phase.
  - Plans need to be made for building the PDS user community. Usage has been quite light so far.
- Data Ingestion
  - The actual priorities for the ingestion of data sets into the PDS Version 1.0 after delivery have not been determined yet.
  - Data set restoration activities must compete with mission interface support for active flight projects for limited data administration resources.

PDS System Delivery Review – Issues and Concerns

Issues and Concerns (Cont.)

- General
  - A 'lessons learned' memo or presentation needs to be developed soon regarding the PDS Version 1.0 life cycle while there is still corporate memory to do it.
  - Limited resources are available to respond to PDS SDR AOCs and to perform other Version 1.0 'clean-up' activities before system delivery.