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# **PDR Wrap-Up: FOS**

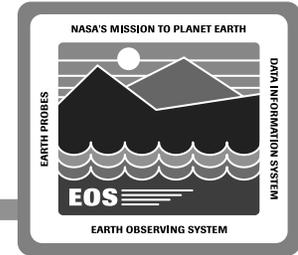
## **Johns / Mack / Moore**

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**23 February 1995**

# Topics

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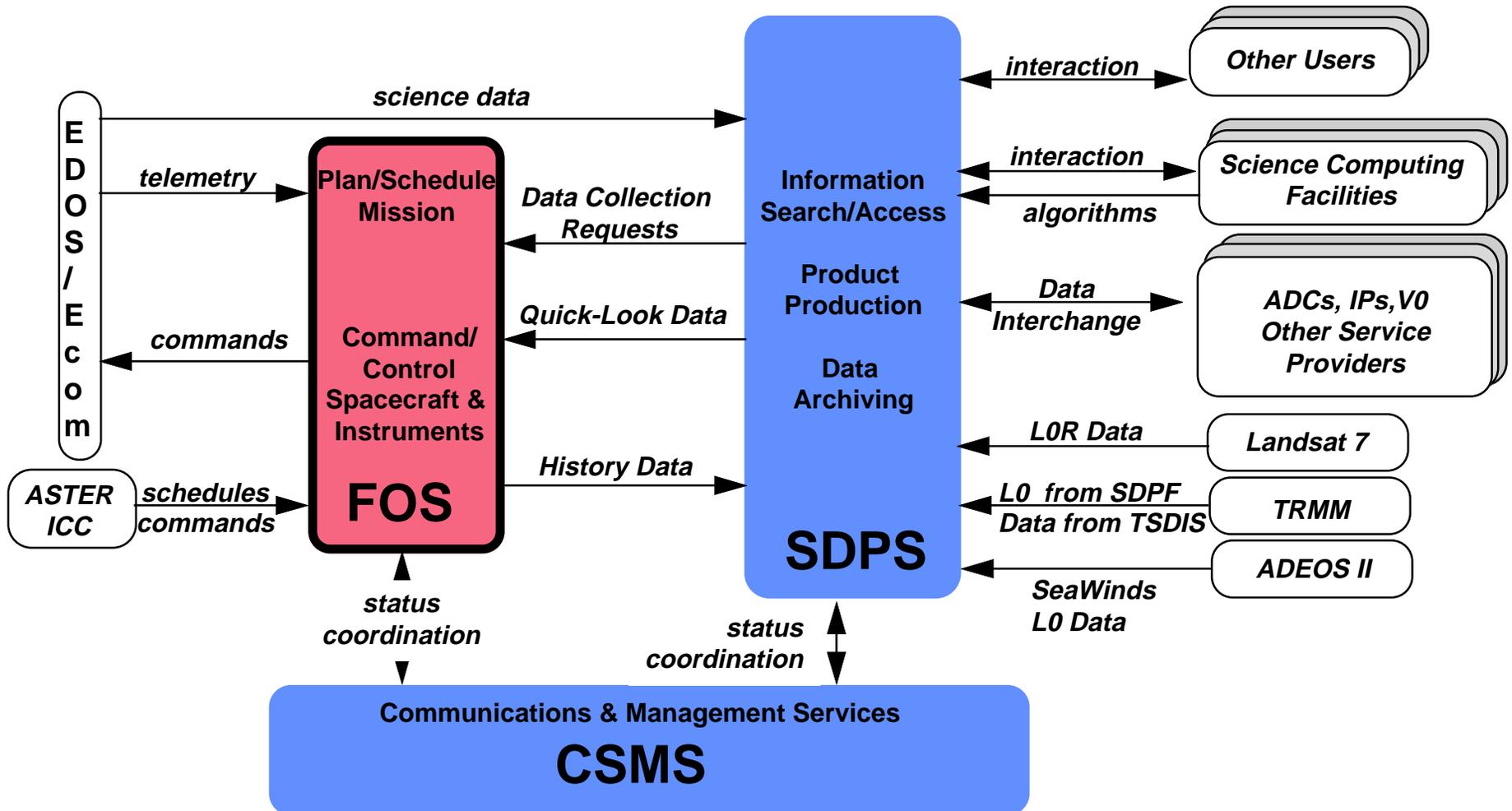
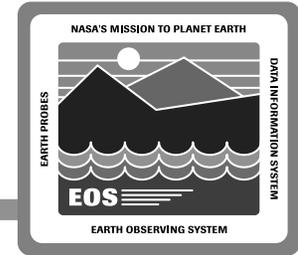


**PDR Summary**

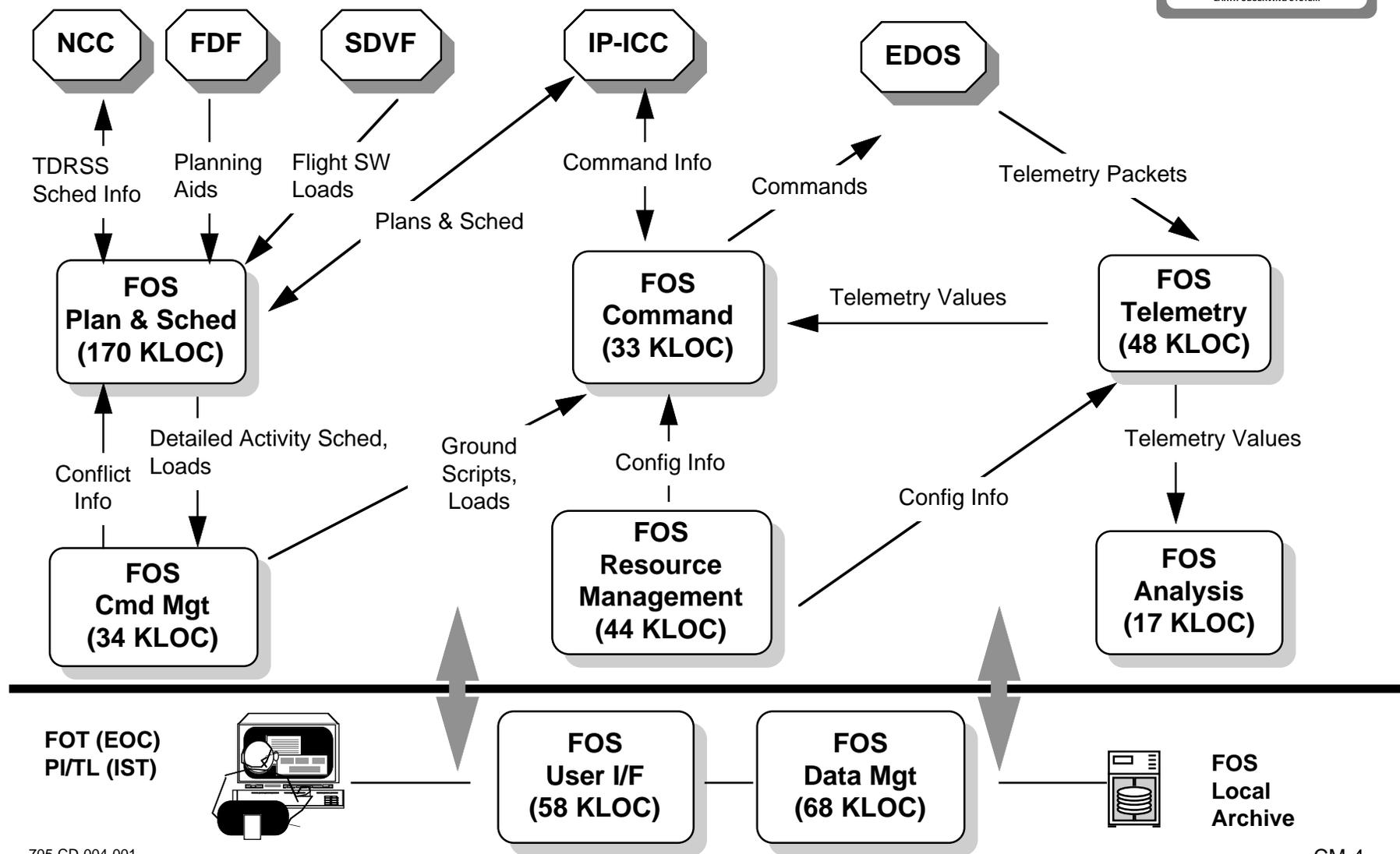
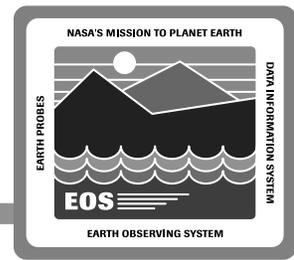
**Review Board Findings**

**RID Status**

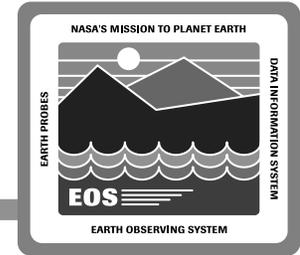
# ECS Context



# FOS High-Level S/W Architecture



# FOS Subsystems



**Planning & Scheduling** - Transforms instrument and spacecraft plans into a single, coherent and conflict-free schedule of future system activities

**Command Management** - Provides management of pre-planned uplink data for EOS spacecraft and instruments based on schedule

**Command** - Provides capability to transmit and verify real-time commands and memory loads

**Telemetry** - Provides capability to receive and process both real-time and recorded health and safety data

**Analysis** - Provided capability to perform spacecraft and instrument systems management (e.g., performance analysis, trend analysis)

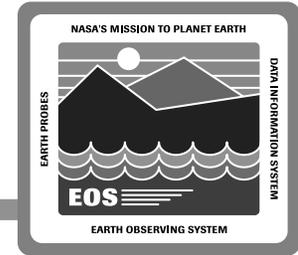
**Data Management** - Generates and maintains project data bases and history logs

**Resource Management** - Provides capabilities to manage the FOS configuration, monitor performance, and manage operator and remote system access

**User Interface** - Provides operator access to system functions and displays

# Key Activities Leading to PDR

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**Instrument Team Workshop - Sept. 94**

**Detailed Requirements Review - Sept. 94**

**AM-1 Project Requirement Review - Oct. 94**

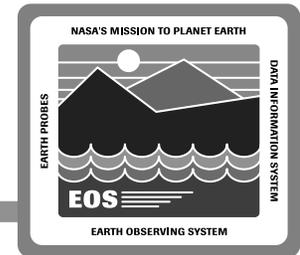
**Preliminary Design Walkthroughs - Oct. & Nov. 94**

**AM-1 Contractor Technical Interchange Meetings/Telecons**

**Closure of all (42) FOS-related RIDs generated from SDR**

# FOS PDR

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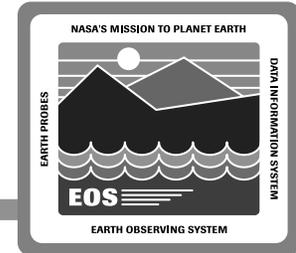
**FOS PDR Held December 13-14, 1995**

**Approximately 140 attendees representing:**

- **AM-1 Project and instrument teams**
- **PM-1 Project and instrument teams**
- **Data Panel**
- **NASA Headquarters**
- **ESDIS Project**
- **EDOS and Ecom**
- **Code 500**
- **IV&V**

# FOS PDR Agenda

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## Day 1 Agenda

**FOS PDR Introduction**

**FOS Overview**

**Engineering Activities**

**FOS Facilities**

**FOS Hardware**

**Network Design**

**FOS Architecture**

**Failure Recovery**

**IST Architecture**

**Support Architecture**

**1st Day Summary Wrap-up**

## Day 2 Agenda

**Scheduling Phase**

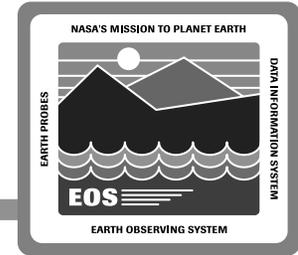
**Real-Time Phase**

**Analysis Phase**

**Segment Scenarios**

**FOS Summary and Wrap up**

# FOS PDR Objectives



## Scope of PDR

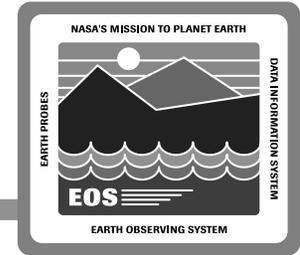
- Release A and B ( Fully operational for AM-1 Launch)
- Validate preliminary design prior to proceeding to the CDR
- Summarize preliminary design

## Present preliminary design document 'review' versions

- Level 4 Requirements Specification (General and AM-1 Mission Specific)
- Design Specification
- Preliminary Release/Development Plan and I&T Plans
- IST Capabilities Document
- FOS ICDs
  - Spacecraft Analysis ICD
  - ASTER ICD,
  - NASA Institutional (NCC, FDF, Ecom, EDOS)

# FOS PDR Objectives

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## **Orient presentation to user community**

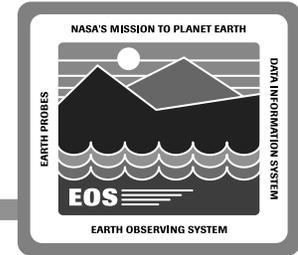
- **Address design from FOS activity phase level**
  - **Scheduling Activity Phase**
  - **Real-Time Phase**
  - **Analysis Phase**

## **Receive feedback from PDR audience through RID process**

- **AM-1 project and ESDIS project**
- **Spacecraft manufacturer**
- **Instrument operations teams**
- **FOS external interfaces**

# FOS PDR Review Panel

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**Bill Mack, Chairperson, Systems Review Office**

**Ed Chang, AM-1 Operations Manager**

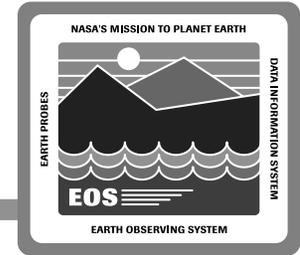
**Curt Schroeder, ECS COTR**

**Bob Connerton, former Hubble Control Center COTR, now key on  
Code 500 Renaissance effort**

**Judy Bruner, Head, Control Center Systems Branch**

**Peter Hughes, Data Systems Technology Division**

# RID Status



## RIDs received

- **Priority 1**
  - 2 RIDs (from Review Board)
- **Priority 2**
  - 131 RIDs (21 Duplicates Received)

## Process for closure

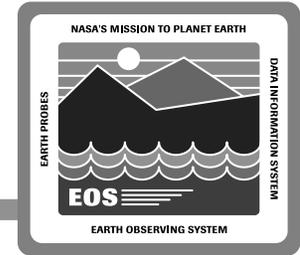
- **Assigned to ECS Responsible Engineer or ESDIS Project**
- **Responses coordinated with NASA FOS team**
- **Responses reviewed by HAIS RID Review Panel**
- **Responses reviewed by ESDIS Project and FOS PDR Review Panel**

## Current status

- **132 RIDs closed**
- **RID 4 (External schedule dependencies) being reworked**

# FOS PDR RID Categories

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**Programmatic (e.g., expandability, schedules, specifications) - 26 RIDs**

**Operations - 10 RIDs**

**ASTER - 11 RIDs**

**IST / User Interface - 30 RIDs**

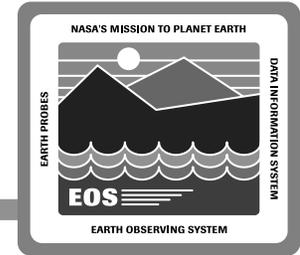
**Scheduling - 19 RIDs**

**Offline Analysis - 11 RIDs**

**Real Time - 21 RIDs**

**Communication - 5 RIDs**

# IOT Involvement



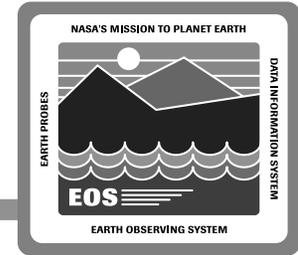
## Issue: RID #2

- Appeared PDR design was a surprise to some Instrument Team members
- Need for more involvement between FOS development and the IOTs

## Status:

- Instrument Advocates have been assigned to coordinate and communicate FOS technical status and issues with the specific Instrument Teams
  - Jim Creegan - (ASTER, CERES, MISR)
  - Rick Broome - (MOPPIT, MODIS, AIRS)
- The IST Capabilities document will become a living document and a means for communication
- Instrument Team Workshops will continue with the FOS development team, the FOT, the IOTs, and the AM-1 Project

# FOS Size and LOC



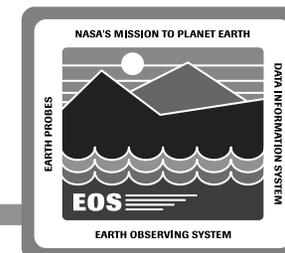
## Issue: RID #14

- How was the Lines of Code computed?
- What portion is “new” vs. adapted vs. reuse?

## Status:

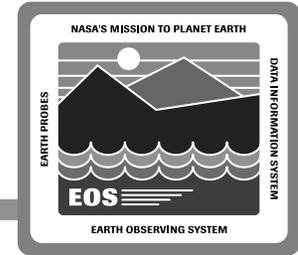
- FOS RID response provided Lines of Code table organized by new code, adapted, internal reuse, and external reuse.
- Identified specific candidates for adapted and reuse code (e.g. TPOCC, GENsaa and OASIS for adapted and UPS and FORMATS for reuse)
- A FOS Reuse Plan was included in the PDR documentation (Section 9.7 of the Design Spec) and will be update at CDR.

# Current FOS LOC



| Subsystem               | New        | Adapted    | Reuse      | Total      |
|-------------------------|------------|------------|------------|------------|
| Planning and Scheduling | 20         | 80         | 70         | 170        |
| Command Mgt             | 22         | 10         | 2          | 34         |
| Command                 | 23         | 10         |            | 33         |
| Telemetry               | 18         | 30         |            | 48         |
| Resource Mgt            | 11         | 31         | 2          | 44         |
| Analysis                | 5          | 10         | 2          | 17         |
| Data Mgt                | 12         | 52         | 4          | 68         |
| User Interface          | 20         | 30         | 8          | 58         |
| <b>Total</b>            | <b>131</b> | <b>253</b> | <b>88</b>  | <b>472</b> |
| <b>%</b>                | <b>28%</b> | <b>54%</b> | <b>18%</b> |            |

# Definition of Terms



- LOC**      **Source code instruction for execution; for C++, this is delimited by a semi-colon**
- New**      **Estimated measure of the new software that needs to be developed for FOS. (e.g. ASTER ICC interface, EDOS CODA processing)**
- Adapted**      **Estimated measure of the software that will be adapted from heritage software or another control center projects with very similar functional requirements. (e.g., TPOCC, GENsaa, OASIS)**
- Reuse**      **Estimated measure of the software that will be directly reused by FOS that was originally developed for a different project. (e.g., TPOCC's TPE, UPS, FORMATS)**