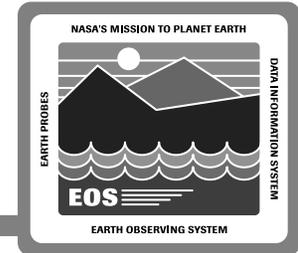


FOS System/Segment Test

Don Owen

18 October 1995

FOS CDR Roadmap



FOS Overview

FOS CDR Overview

- FOS CDR goals
- Driving requirements

Engineering Activities

- Activities since PDR
- FOS team approach

System Architecture

- Overview
- Features

FOS System Architecture

IST

- Capabilities
- Plans

Hardware Design

- Computers
- Peripherals

Network Design

- EOC LAN
- IST Connectivity

FOS Infrastructure

- Mgt Services
- Comm Services

Segment Scenarios

- End-to-End Flow
- Subsystem Interfaces
- Building block linkage

FOS System Design

Subsystem Design

- Detailed design
- FOS functions/tools
- Subsystem design features

RMA

- RMA allocation
- FMEA/CIL

FOT Operations

Operations Overview

- EOC facilities
- FOT positions

Operational Scenarios

- End-to-end flow
- Operations perspective
- FOT tool usage

Road to Launch

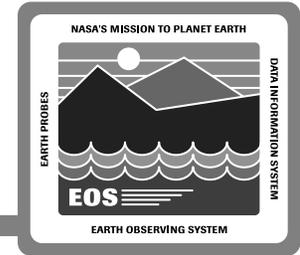
Development

- Release Plan
- Development approach

Testing

- Test Program
- Test Planning

Agenda



FOS System/Segment test program

- **Build/release test highlights**
- **Test schedule**

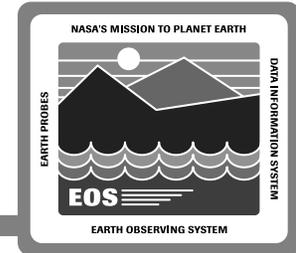
FOS System/Segment test planning

- **Build/release test plan approach**
- **Build/thread approach to test case generation**

FOS System/Segment test environment

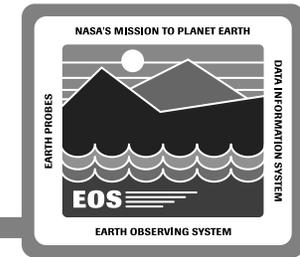
- **FOS test configuration**
- **Test tools**
- **Test data**

FOS System/Segment Test Program



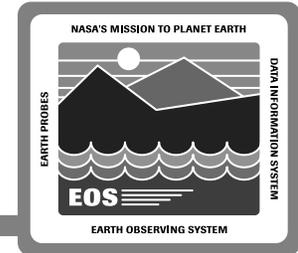
- **Level 3 & level 4 requirements verification**
 - FOS subsystems
 - CSS/MSS-FOS and SDPS-FOS functionality
 - External interfaces
 - System performance
- **Test activity performed prior to IATO acceptance test effort**
 - Informal testing of interim builds A1, B1 begin following code & unit test completion
 - Formal testing of incremental delivery A2 and final delivery B2 begins following respective Test Readiness Review (TRR)
 - Formal testing completes with the Consent to Ship Review (CSR)
- **System/Segment test process defined in:**
 - Verification Plan (DID 401)
 - FOS System/Segment Integration & Test Plan (DID 319/402)
- **Testing performed in accordance with the FOS System/Segment Integration & Test Procedures (DID 322/414)**

FOS System/Segment Test Program (cont.)



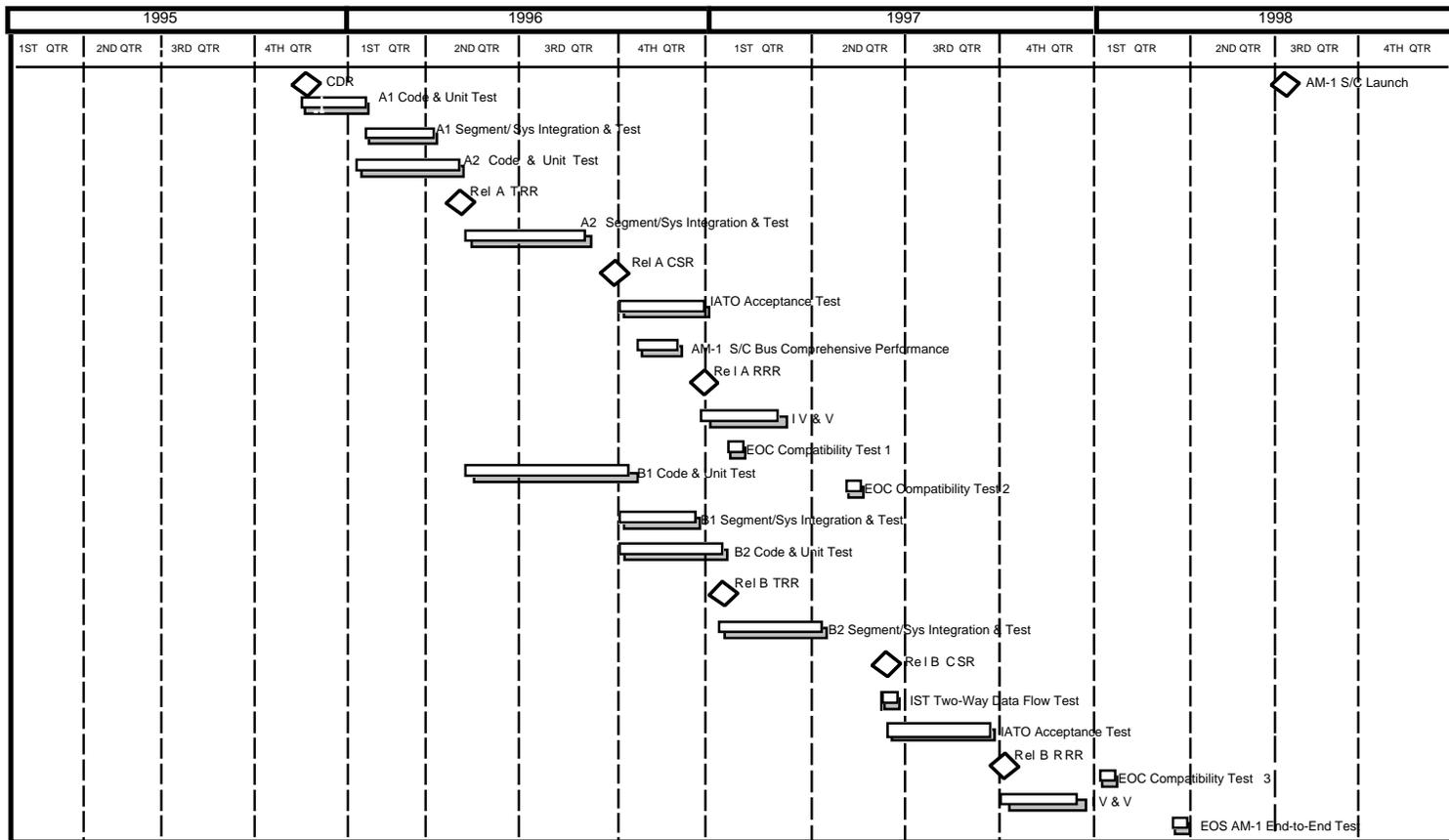
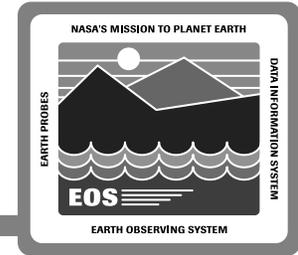
Organization	Development				Operations	
	Code & Unit Testing	Integration	System/Segment Testing	Acceptance Testing	IV&V Testing Pre-Ops	OPS Testing
FOS Segment Development	Perform	Perform	Support	Support	Support	Support
FOS System/Segment Test	Monitor	Witness	Perform	Support	Support	Support
IATO			Witness	Perform	Support	Support
FOT	Support	Support	Support	Support	Support	Perform
IV&V Contractor			Monitor	Witness	Perform	
Quality Office	Monitor	Monitor	Witness	Witness	Support	Support
Configuration & Data Mgmt	Support	Support	Support	Support	Support	Support

Build/Release Test Highlights

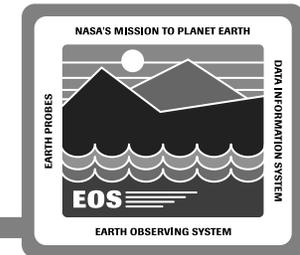


Release Baseline	Release Type	Release Activity
A1	Internal	<p>Informal testing of integrated A1 functionality</p> <p>Testing based on internal build A1 test cases</p>
A2	Incremental	<p>Testing of integrated A1/A2 functionality</p> <p>Testing based on A1/A2 test cases</p> <p>All software discrepancies tracked through DDTs</p> <p>Formal delivery to GSFC</p> <p>IATO, IV&V testing</p>
B1	Internal	<p>Informal testing of integrated A1/A2/B1 functionality</p> <p>Testing based on A1/A2/B1 test cases</p>
B2	Formal	<p>Formal delivery</p> <p>Testing based on A1/A2/B1/B2 test cases</p> <p>All software discrepancies tracked through DDTs</p> <p>IATO, IV&V testing</p> <p>FOS ready to support late ESDIS testing</p> <p>Full AM-1 ground support capabilities</p>

FOS Test Schedule



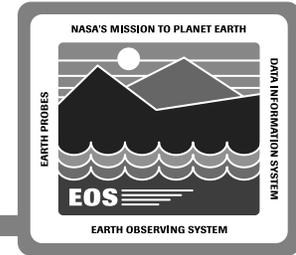
FOS System/Segment Test Planning



Prepare test plans & procedures:

- **Based on build/thread approach**
 - Breaks down subsystem threads into testable components
 - Component delivery dates identified (i.e. A1, A2, B1, B2)
 - Provides a structured approach to testing
- **Test procedures based on approved plans**
- **Test reports**
 - Presentation on results of A2 System/Segment testing at interim release A CSR; B2 testing at release B CSR
 - Test results analyzed vs. expected results
 - All software discrepancies identified
 - Test deviations described
- **Discrepancy reporting**
 - All NCRs written during A2, B2 tests tracked by DDTS and controlled by the NCR Board

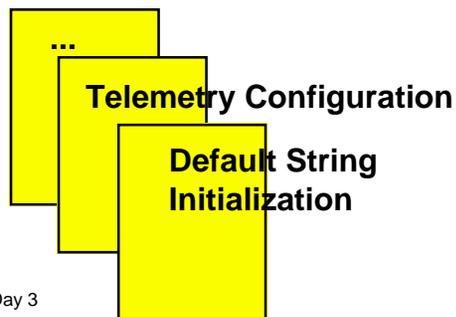
Test Case Generation & the Build/Thread Approach



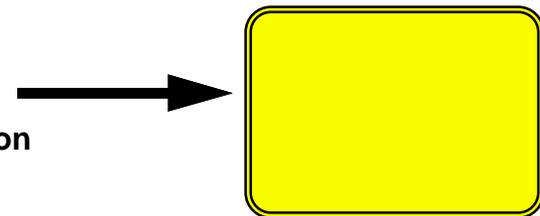
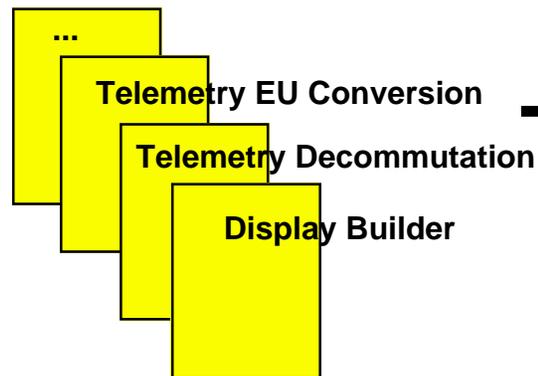
RELEASE FUNCTIONALITY MATRIX (Release Plan example)					
Activity Phase	Thread	Component	Subsystem	Rel.	Release A/B Build
...					
Real-Time Operations	String Initialization	Create Default Strings	RMS	A	1
		Configure TLM	RMS	A	1
...
Support - User Interface	Tools	Display Builder	FUI	A	2
...
Telemetry	Real-time Monitoring	Tlm Processing - Decom	TLM	A	2
		EU Conversion	TLM	A	2



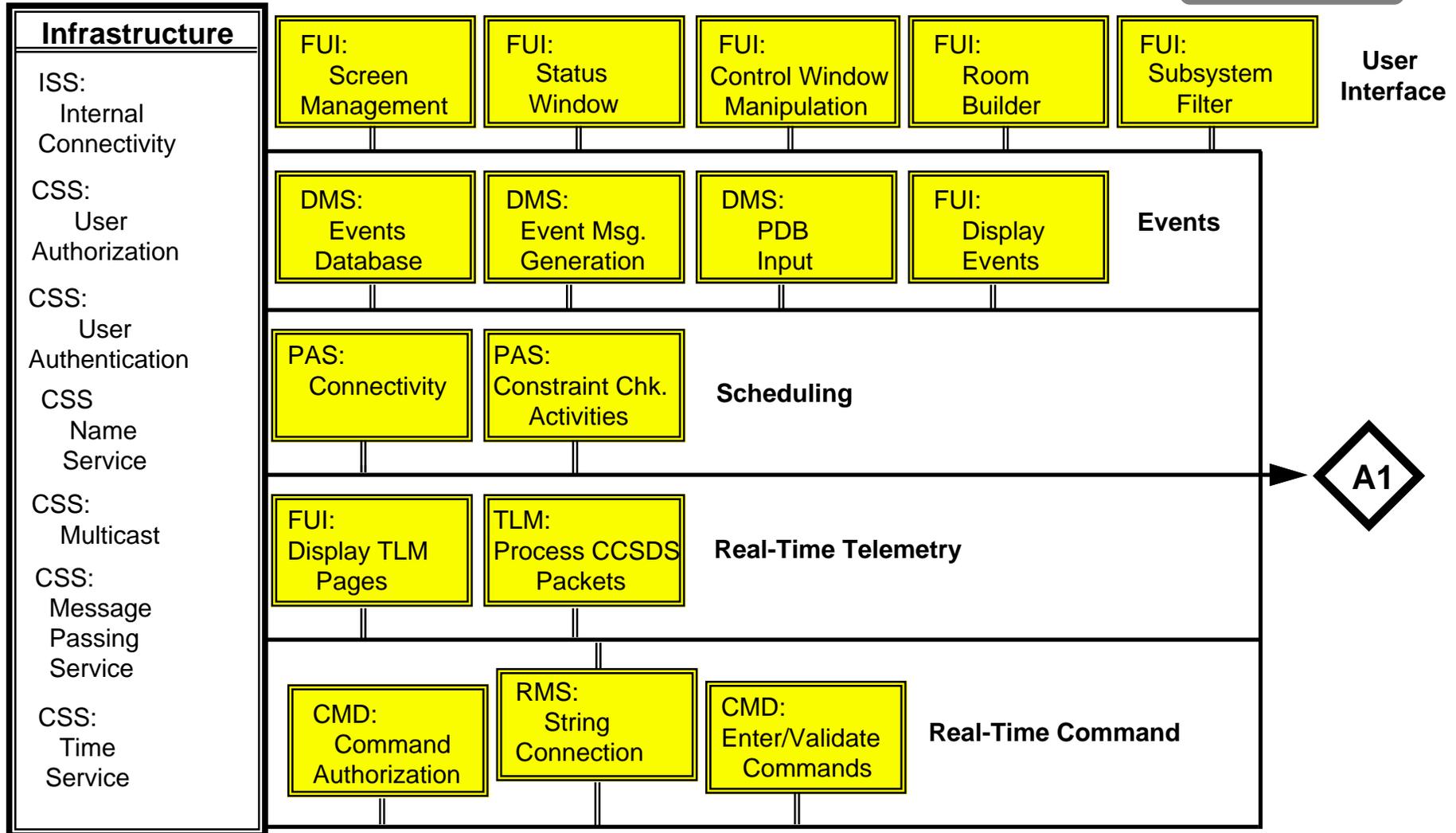
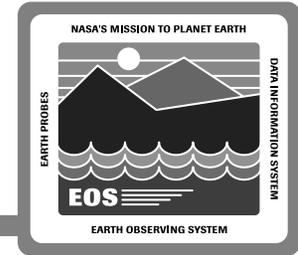
A1 Test Cases:



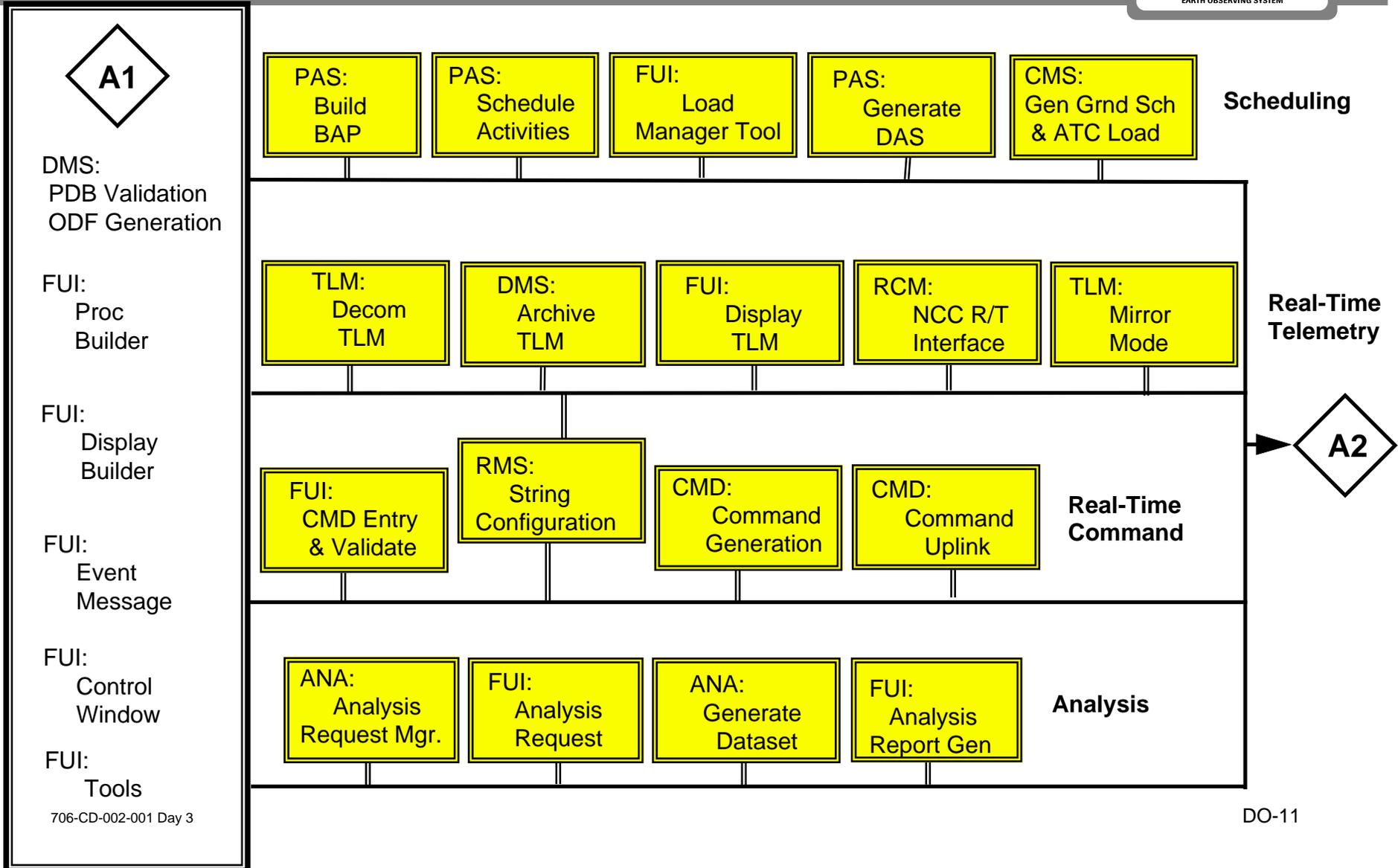
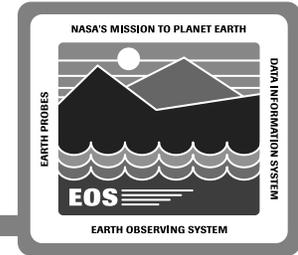
A2 Test Cases:



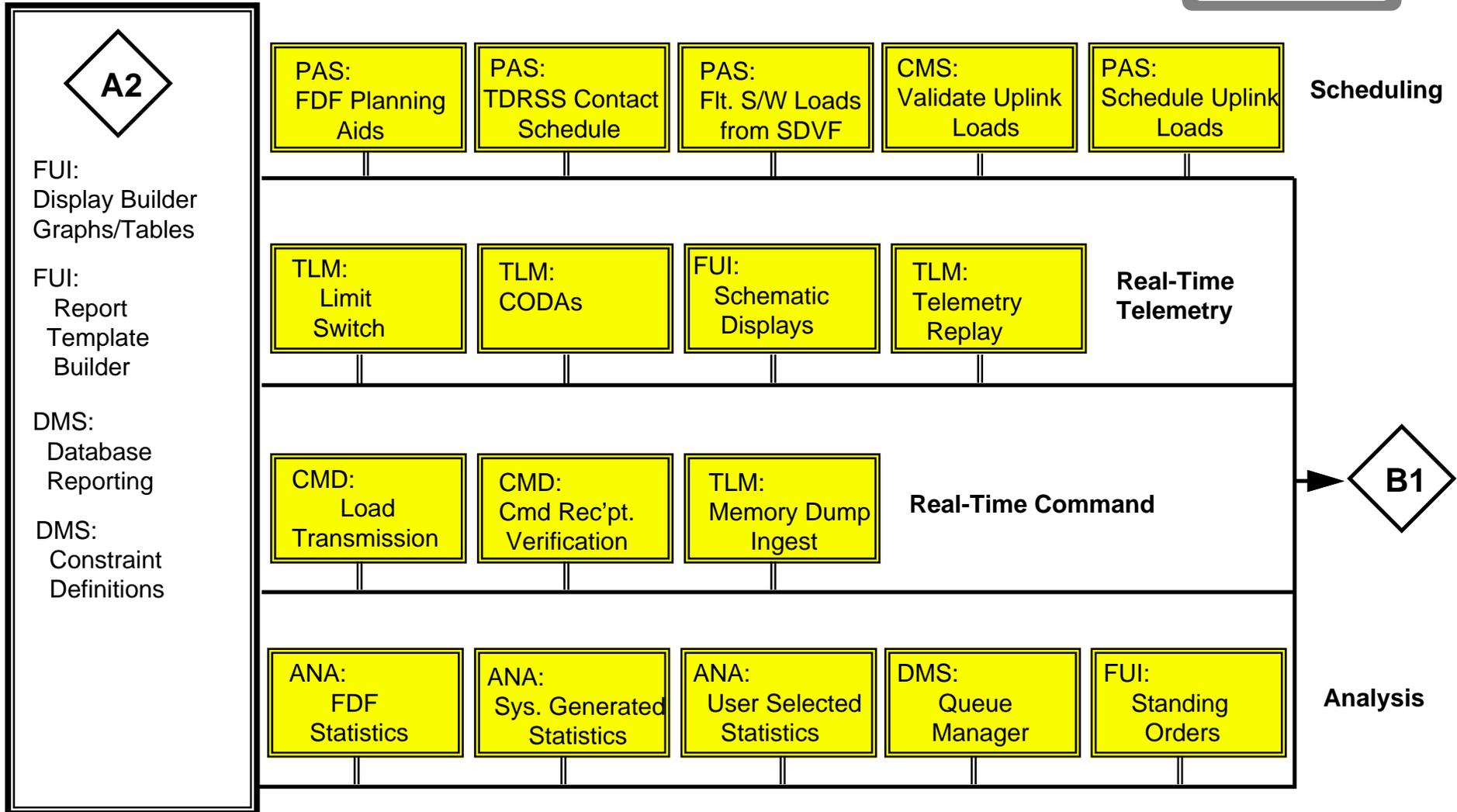
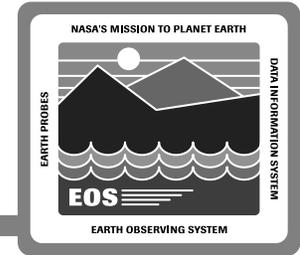
FOS A1 Test Thread Highlights



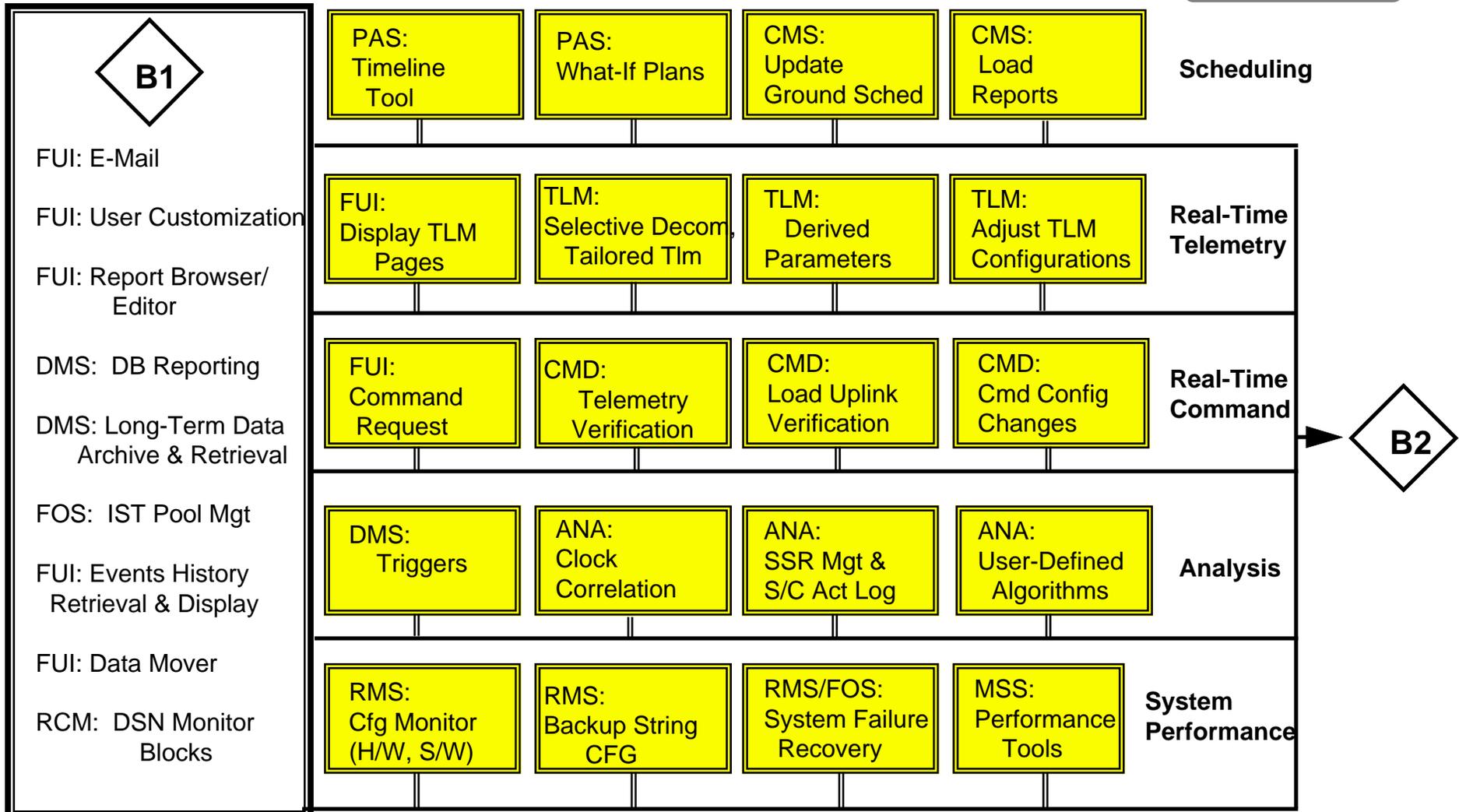
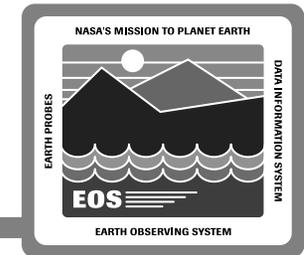
FOS A2 Test Thread Highlights



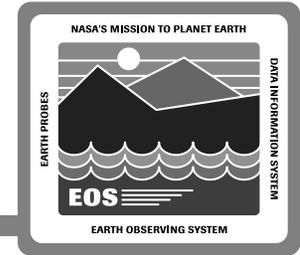
FOS B1 Test Thread Highlights



FOS B2 Test Thread Highlights



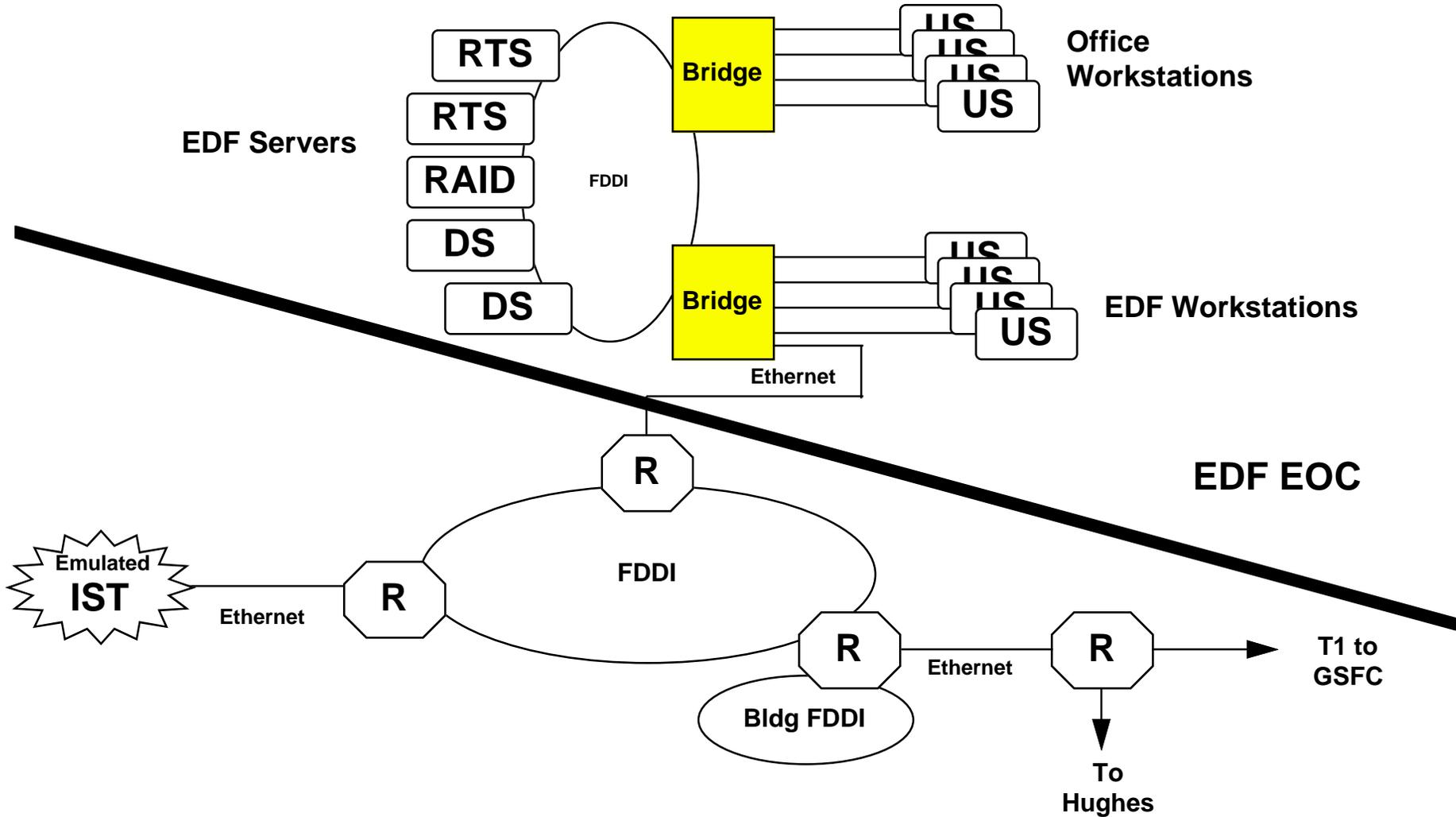
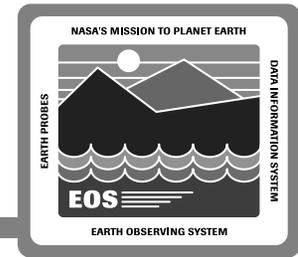
FOS Test Environment



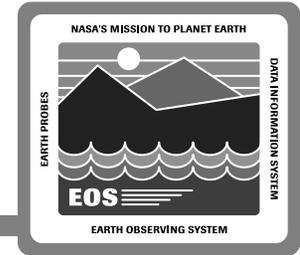
Hardware configuration:

- **EDF emulates GSFC Bldg 32 - core functionality identical**
 - EOC
 - ISTs
 - Emulated interfaces (e.g. FDF user station, etc.)
- **Redundant hardware allows for concurrent development activity and testing**

FOS Test Configuration



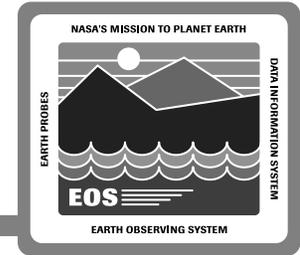
Test Tools



Test tools:

- **XRunner**
 - **Allows capture & playback of test scripts**
 - **Automates testing and data setup**
 - **Test repeatability**
 - **X-windows/GUI based**
 - **Used for regression testing**
- **LoadRunner**
 - **Allows multiple copies of a test session to be invoked from many sources**
 - **Used for performance/load testing**
- **ClearCase distributed software CM tool**
- **Distributed Defect Tracking System (DDTS)**
- **Requirements Traceability Management (RTM) tool**

Test Data



- **Datasets defined during test planning phase**
 - **Complete list of datasets and definitions available in the FOS System/Segment I&T Plan (DID 319/402)**
 - **Data characteristics (e.g. packet content, etc.) and data set sizes identified**
 - **Responsible subsystem(s) (i.e. telemetry, command, planning & scheduling, etc.) identified**
- **Use existing data/data drivers when possible (e.g. FDF planning aid files resident at the EOC despite unavailability of FDF)**