

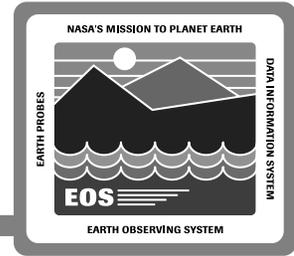
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# Resource Management Subsystem

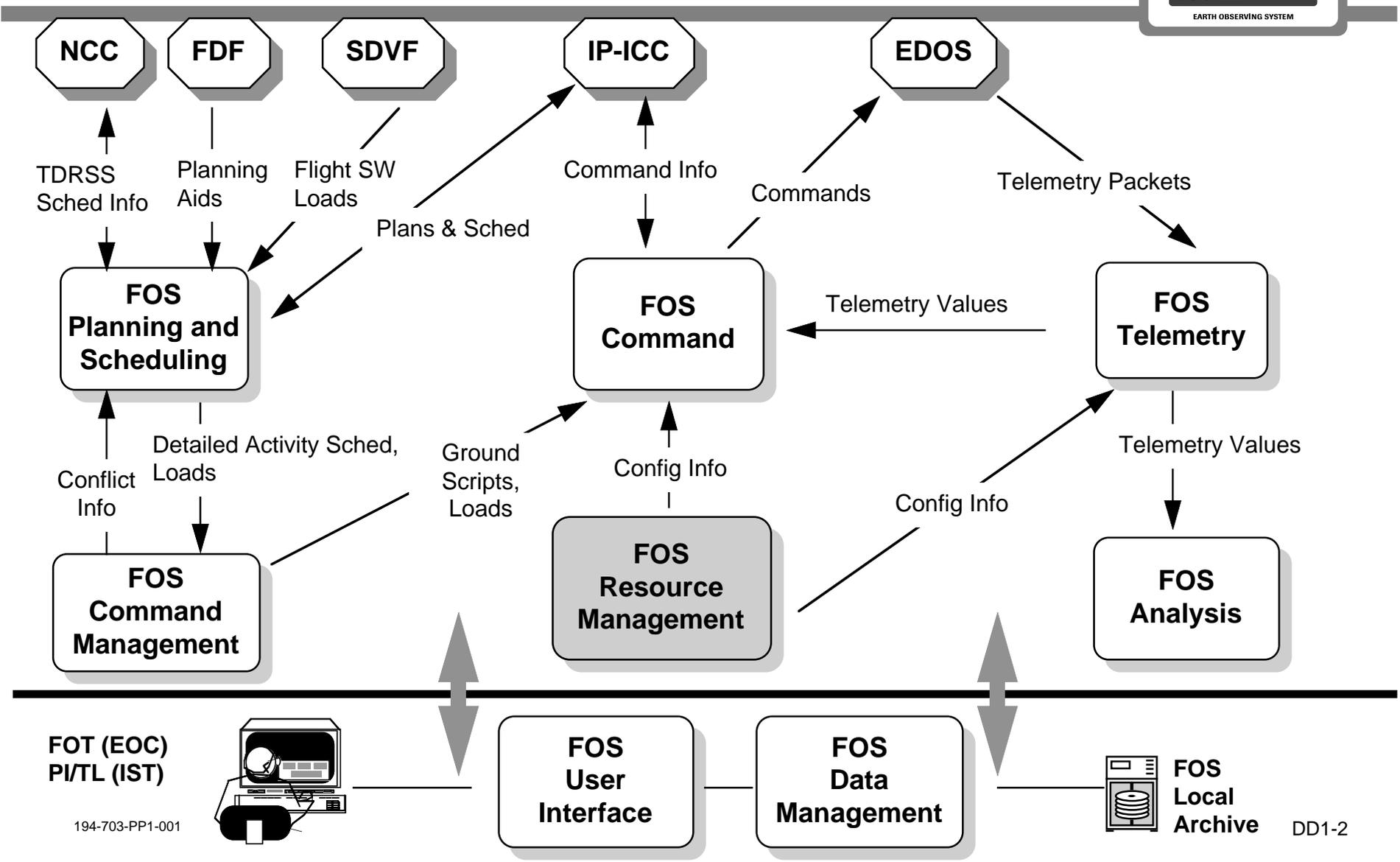
Debbie Dunn

System Design Review - 28 June 1994

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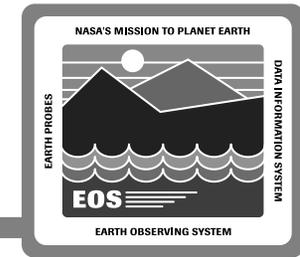


# FOS Subsystem Diagram



# Resource Management Subsystem Outline

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## Resource Management Subsystem Overview

- Design Drivers

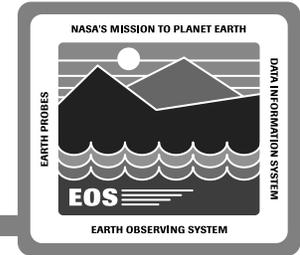
## Resource Management Subsystem Context

- Context Diagram
- Interface Description
- Scenarios

## Resource Management Subsystem Design

- Object Model
- Design Description
- Scenarios

# Resource Management Subsystem Overview



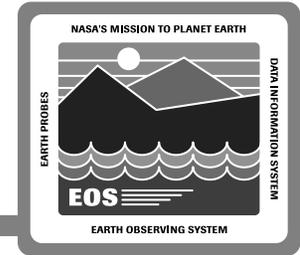
## Resource Management Subsystem Functions

- **Configuring FOS resources for multi-mission support**
  - Logical strings
  - IST connections
- **Automated failure recovery during real-time contacts**
- **Monitoring EOC hardware and software subsystems**
- **Managing Space Network (SN) configuration in real-time via the NCC**
  - Ground Control Message Requests (GCMRs)

**Supports the EOC Operator in configuring and monitoring ground configuration**

**Allows the Instrument Team to connect to the EOC via an IST**

# Resource Management Subsystem Design Drivers



## Multi-mission support

- Support concurrent real-time operations for multiple spacecraft and their instruments
- Ensure single point of command for a given spacecraft

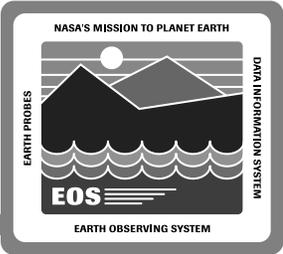
Support of multiple modes (e.g. test, training, operations) on a non-interference basis

## Support of the FOS availability requirements

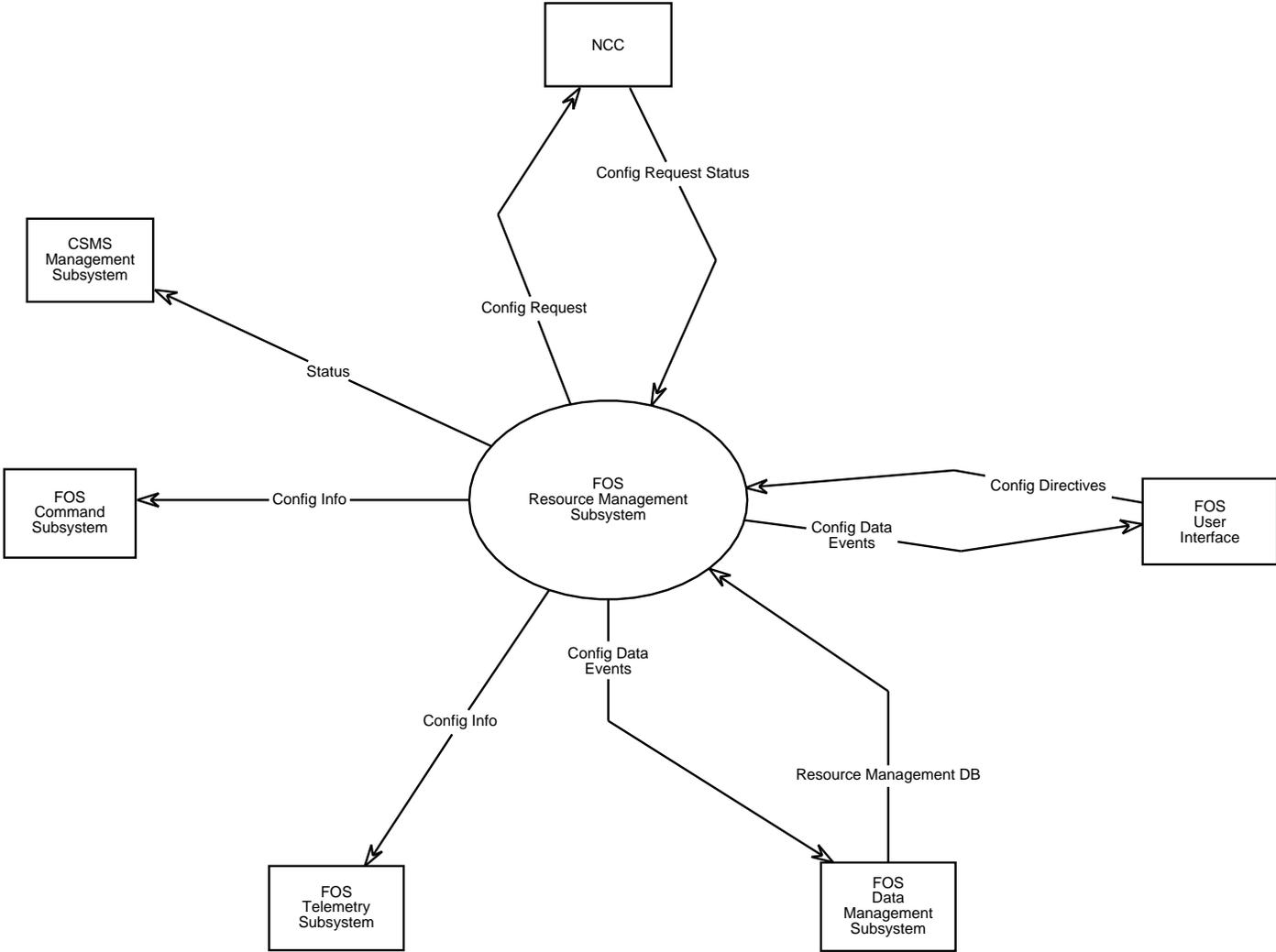
- Facilitate failure detection
- Provide software switching capabilities

## IST Policy

- Manage IST connection pool

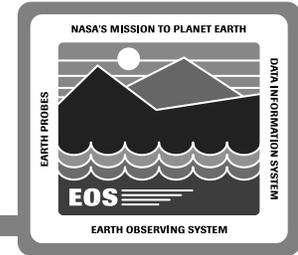


# Resource Management Subsystem Context Diagram



# Resource Management Subsystem Context Description

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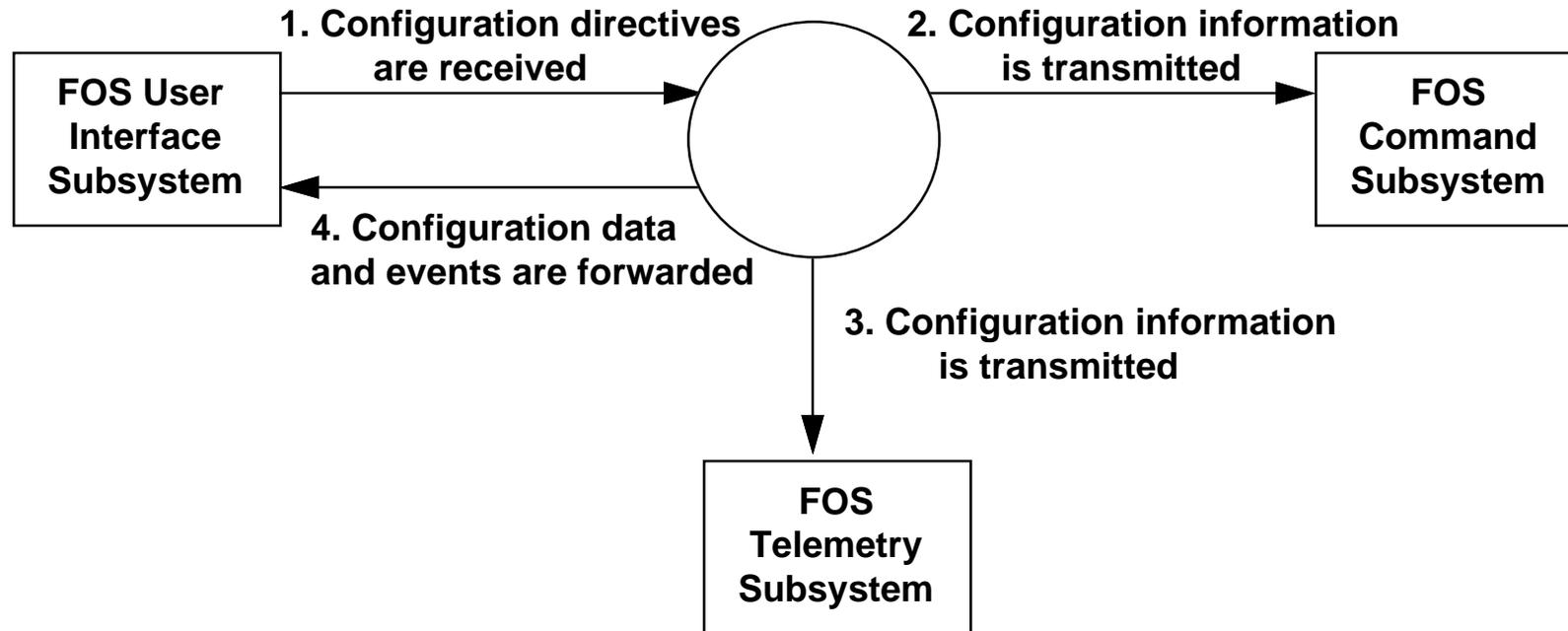
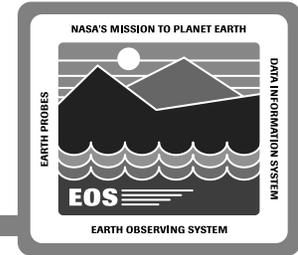
**Resource Management Subsystem interfaces support the following scenarios with respect to operations of the EOS spacecraft and instruments**

- **EOC configuration**
- **Space Network (SN) real-time configuration**

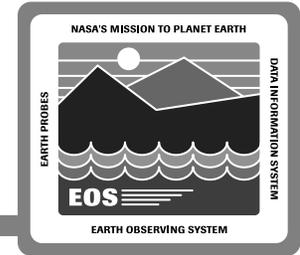
## **Facilitating Interfaces**

- **FOS Data Management Subsystem provides the resource management database**
- **CSMS Management Subsystem receives resource management subsystem status**

# Resource Management Subsystem EOC Configuration Scenario

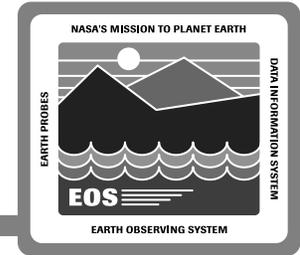


# Resource Management Subsystem EOC Configuration Scenario



- (1) Configuration directives are received from the FOS User Interface**
  - Request to connect to a logical string
  - Request to assume command authority for a logical string
  - Request to failover processing for a logical string
- (2) Configuration information is transmitted to the FOS Command Subsystem**
  - Upon logical string creation this includes database identification and forward link information
  - Upon change in command authority this includes identification of new Command Activity Controller
  - Upon request to failover processing for a logical string this includes new mode (active, redundant)

# Resource Management Subsystem EOC Configuration Scenario (cont.)

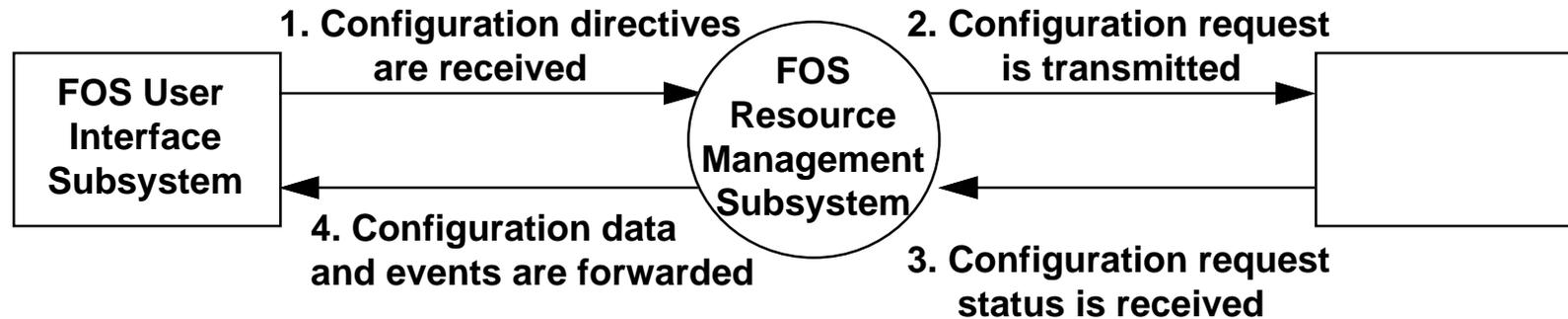
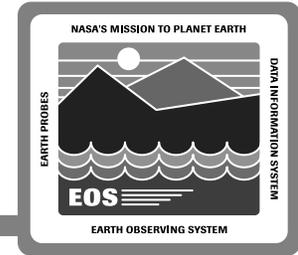


**(3) Configuration information is transmitted to the FOS Telemetry Subsystem**

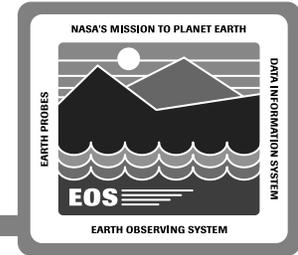
- **Upon logical string creation this includes database identification and return link information**

**(4) Configuration data and events are provided to the FOS User Interface and the FOS Data Management Subsystem**

# Resource Management Subsystem SN Configuration Scenario



# Resource Management Subsystem SN Configuration Scenario



**(1) Configuration directives are received from the FOS User Interface**

- Requests to modify scheduled events and network resources in real-time
- Requests for performance data relative to ongoing events

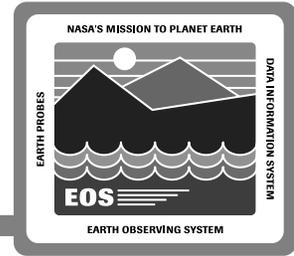
**(2) Real-time configuration requests are transmitted to the Network Control Center (NCC)**

- Ground control messages (e.g. reacquisition requests)
- Performance data request (e.g. return channel time delay measurement)

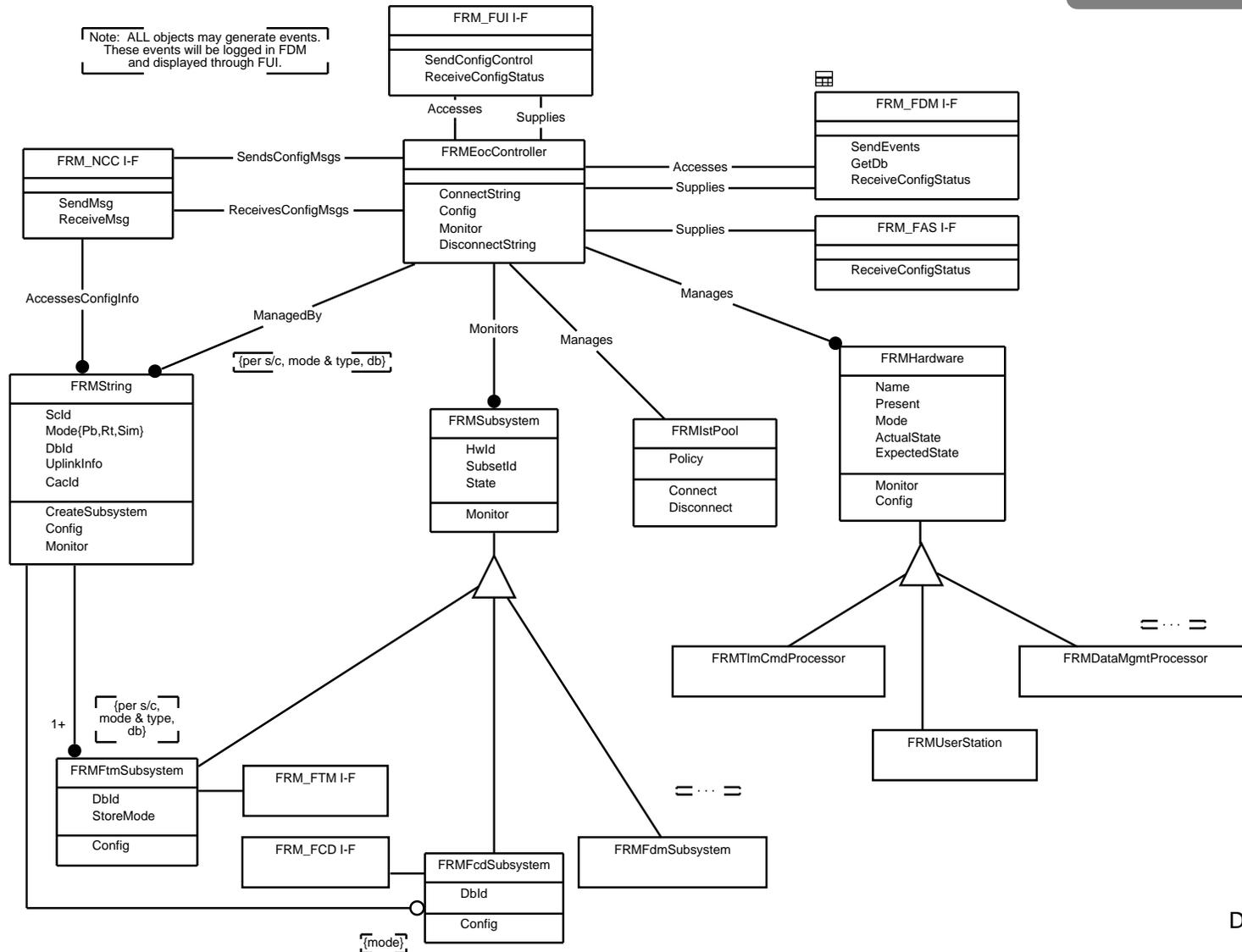
**(3) Configuration request status is received from the NCC**

**(4) Configuration data and events are provided to the FOS User Interface and the FOS Data Management Subsystem**

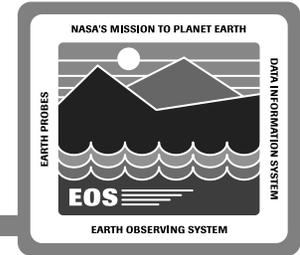
**User Performance Data from the NCC will be processed via the FOS Telemetry Subsystem**



# Resource Management Subsystem Object Model



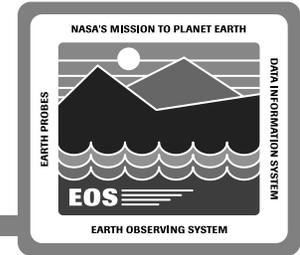
# Resource Management Subsystem Design Description



## Object Model Scope

- **Configuration and monitoring of all EOC mission critical hardware and software to support operations of multiple EOS spacecraft and instruments**
- **Managing IST connections in support of instrument operations**
- **Creates/terminates logical strings for performing real-time spacecraft and instrument operations**
- **Redundancy will be provided in the Resource Management Subsystem to ensure that it is not a single point of failure within the EOC**

# Resource Management Subsystem Design Description



## FRMEocController Class

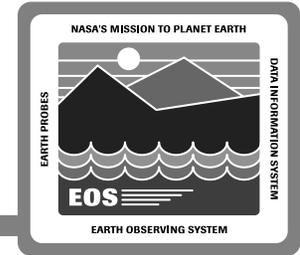
- **Manages the EOC configuration**
- **Manages the IST Pool**
- **Provides FOS User Interface with access to the EOC Configuration**

## FRMString Class

- **Multiple instances of this class (one per logical string)**
  - **Redundant logical strings for real-time processing allow quick failure recovery**
- **Associated with one command subsystem (optionally)**
- **Associated with one or more telemetry subsystems**
- **Create/terminate/configure subsystems for logical string (i.e. command, telemetry)**
- **Modify Space Network (SN) configuration for logical string via NCC**

# Resource Management Subsystem Design Description

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## FRMIstPool

- Implements the IST Policy for managing IST connections

## FRMSubsystem

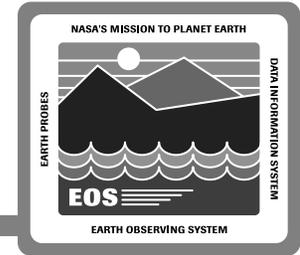
- Monitor state of FOS subsystems

## FRMHardware

- Compare expected state of hardware with actual state

# Resource Management Subsystem Design Description

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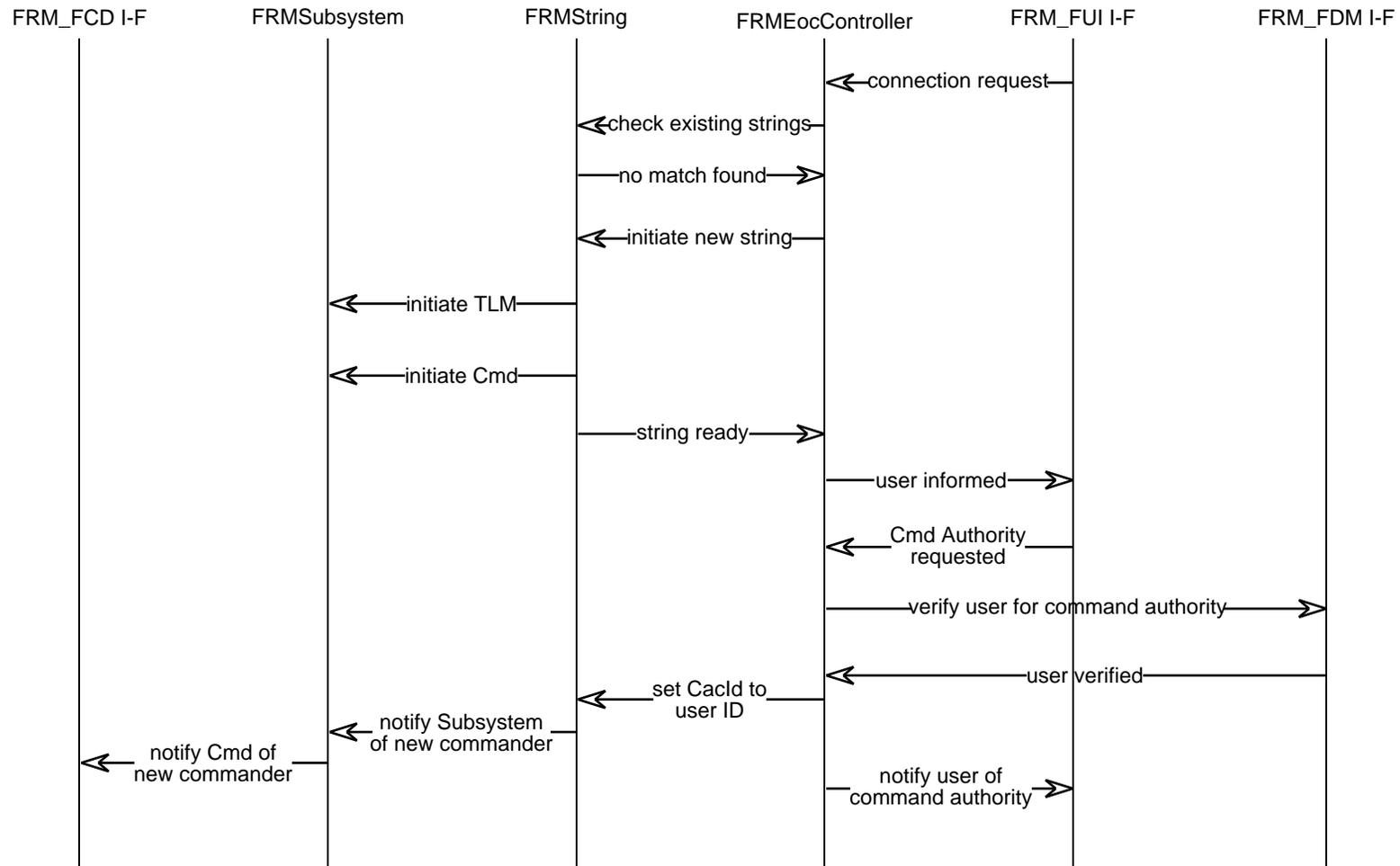
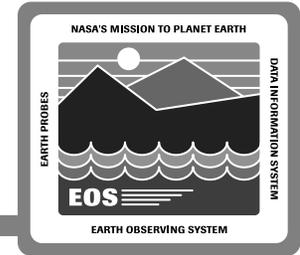
## Mission Specific Hooks

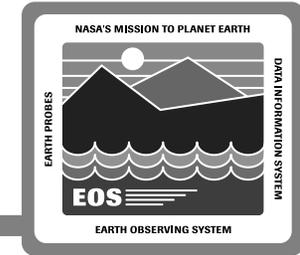
- **FRMString**
  - Associations with one or more telemetry subsystems

## Evolutionary Hooks

- **FRMlstPool**
  - IST Policy can be expanded or modified
- **FRMSubsystem**
  - Expandable to handle new/modified FOS subsystems
- **FRMHardware**
  - Expandable to handle additional classes of computers

# Resource Management Subsystem String Connection Scenario





# Resource Management Subsystem String Connection Scenario

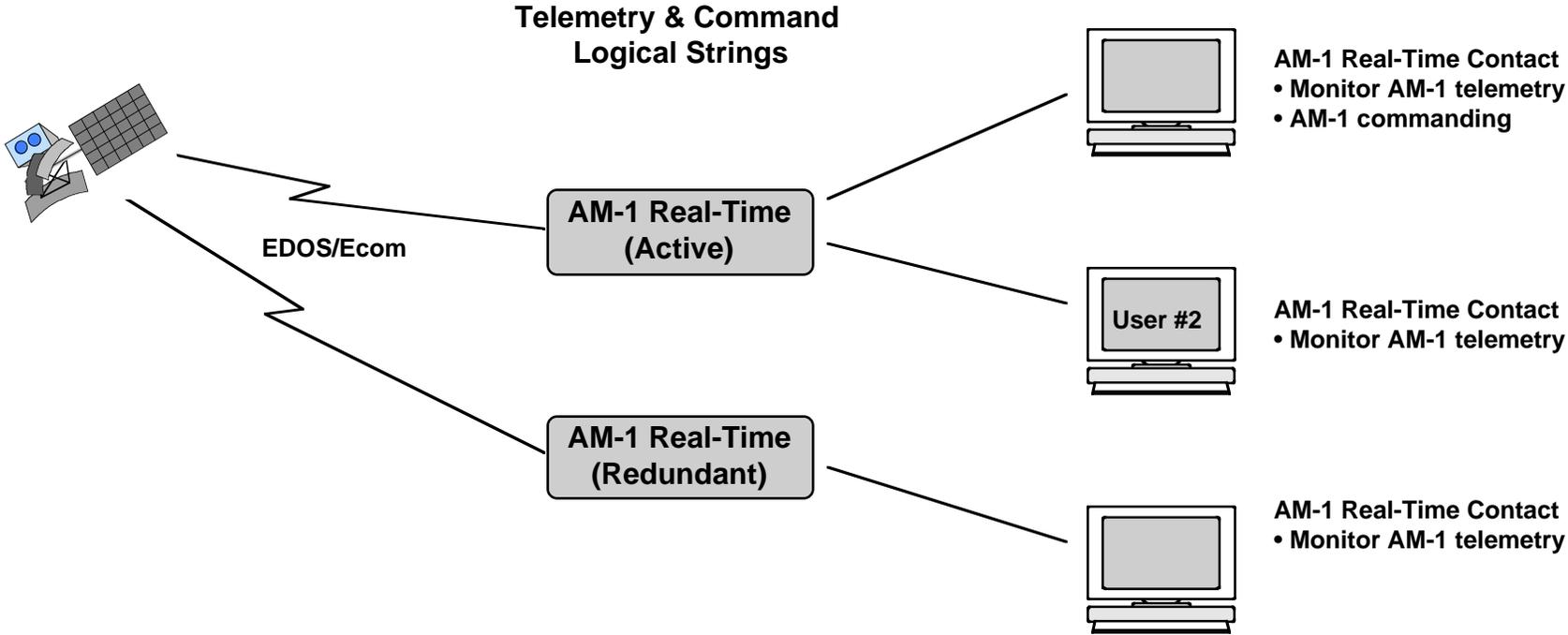
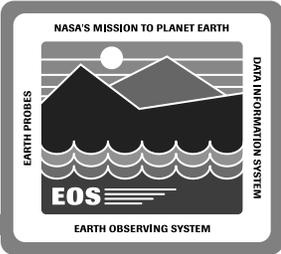
**Process configuration directive (connection request) received from the FOS User Interface**

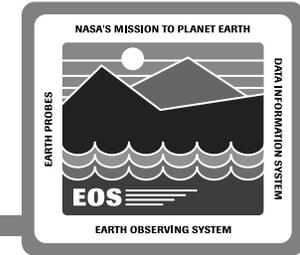
- **Check if existing logical string satisfies the request**
- **If not, initiate a new logical string**
  - **Initiate and configure telemetry subsystem(s)**
  - **Initiate and configure command subsystem**
- **Provide FOS User Interface with logical string id**
  - **allows FOS User Interface to communicate directly with the appropriate subsystems**

**Process configuration directive (command authority request) received from the FOS User Interface**

- **Verify user is authorized for command authority via the FOS Data Management System**
- **Notify command subsystem of new Command Activity Controller**

# FOS Redundant Configurations





# Resource Management Subsystem Failure Recovery Scenario

**Redundant strings are configured for real-time operations of a given mission**

- **Active logical string (single point of command)**
- **Redundant logical string(s)**

**Events are generated indicating a failure within the EOC affecting the active string for that mission**

- **Resource Management Subsystem**
- **Telemetry Subsystem**
- **Command Subsystem**

**Process configuration directive (failover to redundant logical string) received from the FOS User Interface**

- **Active logical string becomes redundant**
- **Redundant logical string becomes active**

**Process configuration directive (command authority request) received from the FOS User Interface**