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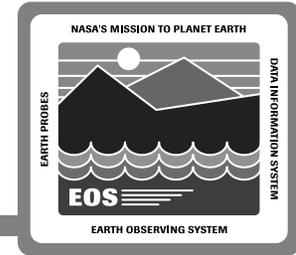
# Operational Overview

Rick Hudson

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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

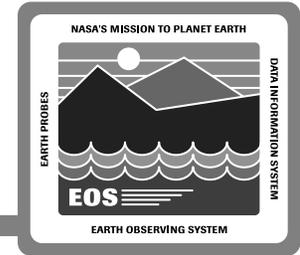
### Testing

- Test approach
- Test organization

### Acceptance Test

- IATO role
- Acceptance test approach

# Topics



**Flight Operations**

**EOC Facilities**

**Operational Scenarios**

- **Operations Configured Items**
- **Operations Configuration Management**
- **System Initialization**
- **Scheduling**
- **Real Time**
- **Analysis**
- **Uplink Life Cycle**
- **Solid State Recorder Management**

**Rick Hudson**

**Rick Hudson**

**Ron Jones**

**Ron Jones**

**Nelson Pingitore**

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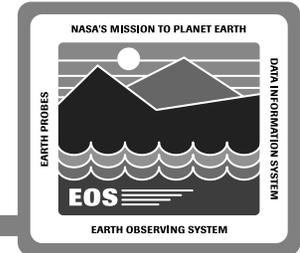
**Ron Jones**

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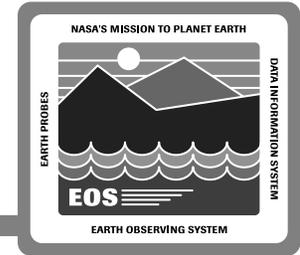
# Flight Operations



- To ensure spacecraft and instrument operational requirements are implemented in the FOS design, ECS Operations Personnel “FOT” have been working “Hand-In-Hand” with:
  - NASA AM Project (OM, S/C Manufacturer)
  - NASA MOM
  - FOS Developers
- ESDIS & AM Projects coordinating the formation of a AM-1 FOT:
  - Operations personnel from Spacecraft Manufacturer & ECS will provide FOT for pre-launch, launch, and on-orbit checkout
  - Spacecraft Manufacturer leads FOT through on-orbit checkout
  - ECS provides FOT starting with operational phase till end of mission

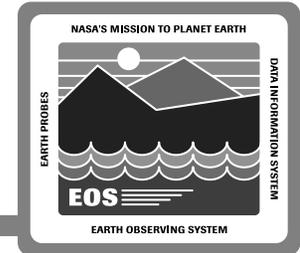
# FOT Influence on FOS Design

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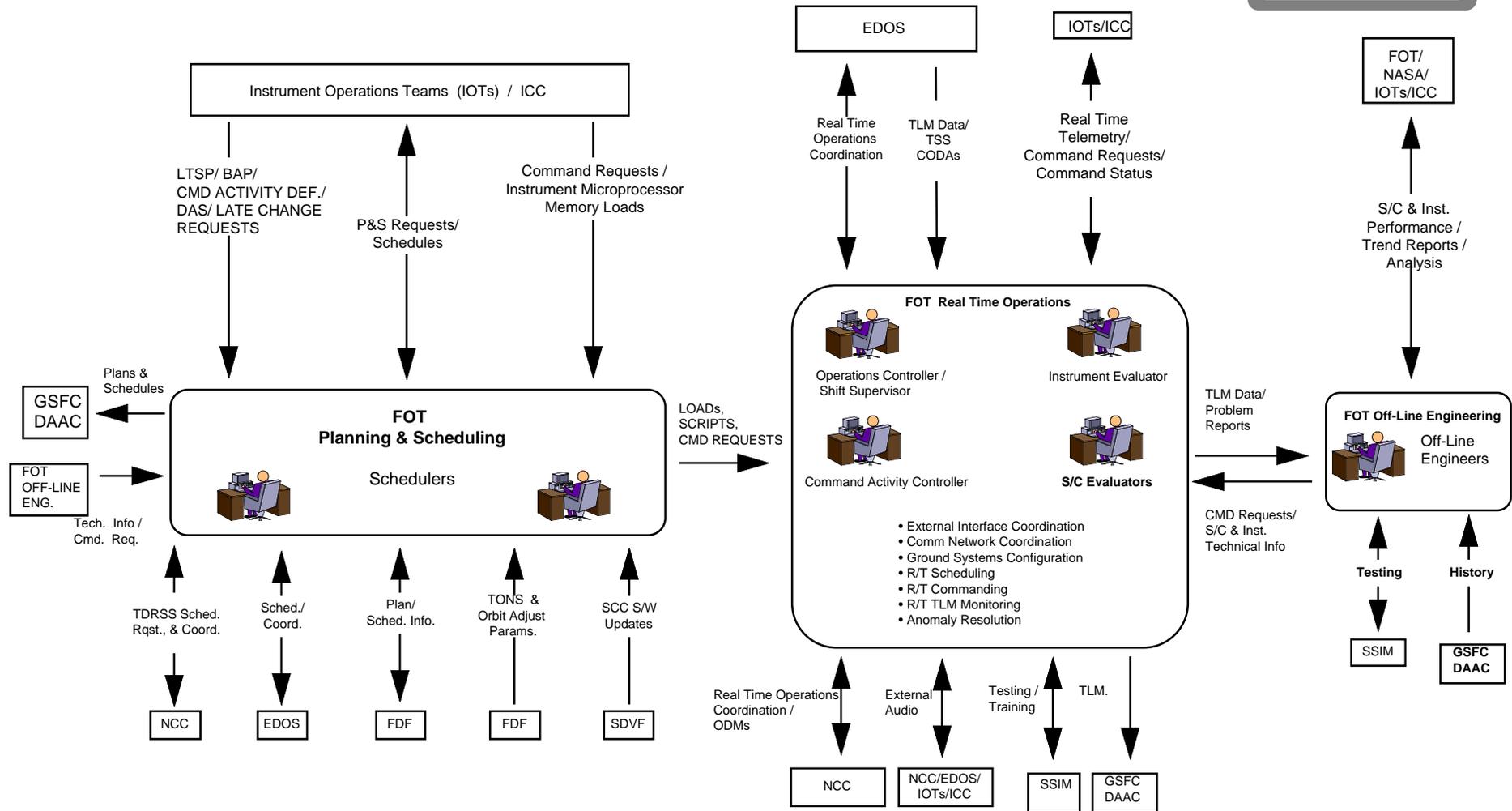
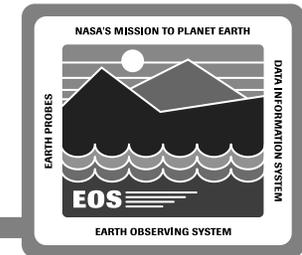
- **Specific Examples of FOT Influence on FOS Design Include:**
  - **SSR Management**
  - **S/C Activity Log Management**
  - **P&S Capabilities**
  - **CMS Activity Definition**
  - **ECS Command Language (ECL)**
  - **Custom Report capability**
  - **Analysis Reports**
  - **Triggers**

# FOT Functions

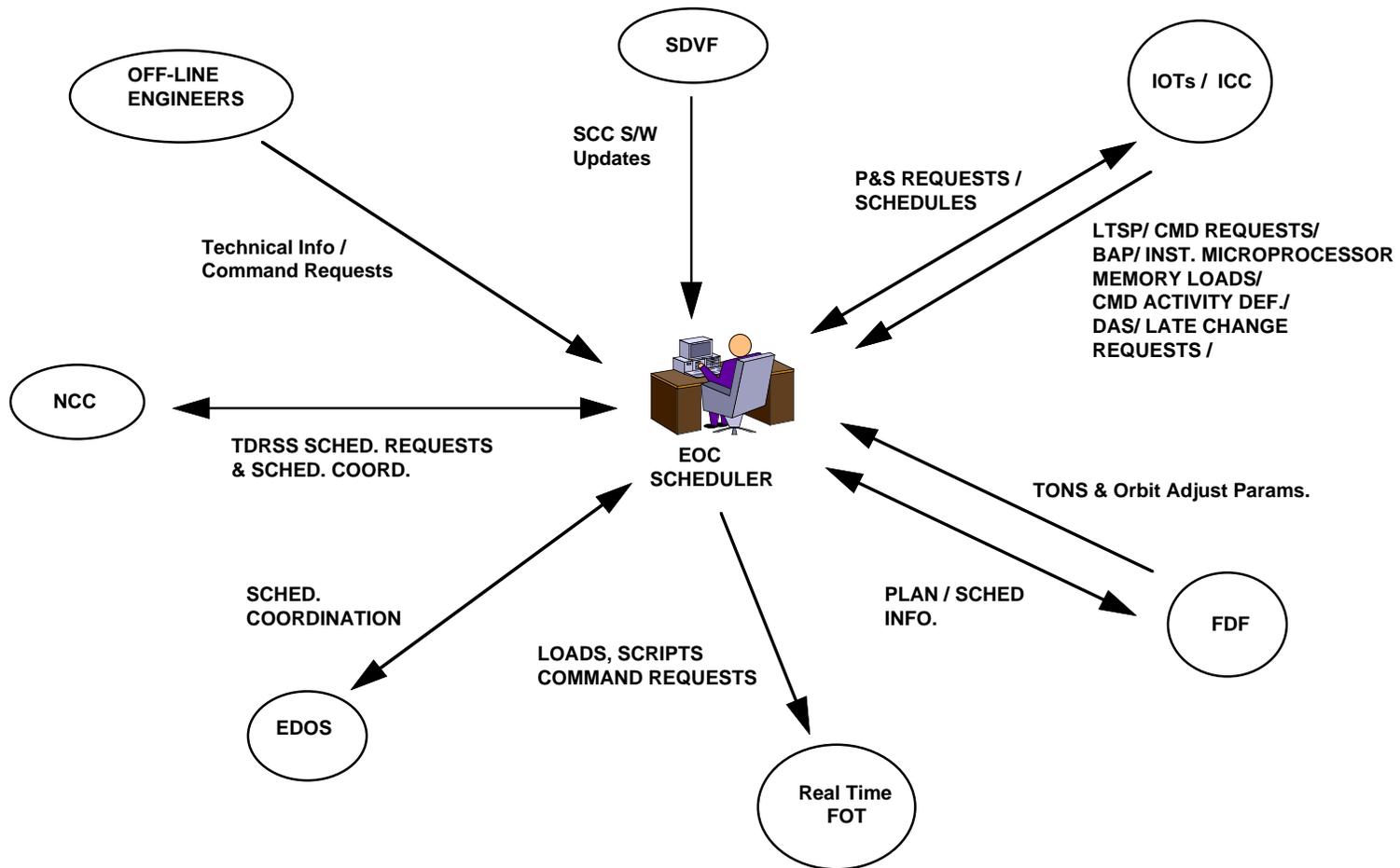
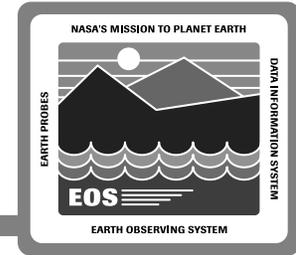


- **EOC FOT performs several functions:**
  - **Real Time (occur during a contact)**
  - **Off-Line (support Real Time efforts, and S/C Health /Safety)**
  - **S/W Maintenance and DB Management**
  - **Management (administrative and support)**
- **Functions that have major interaction with the FOS include:**
  - **Scheduling**
  - **Real Time Operations**
    - Ops Controller/Shift Supervisor**
    - Command Activity Controller**
    - Spacecraft Evaluator**
    - Instrument Evaluator**
  - **Off-Line S/C & Instrument Engineers**

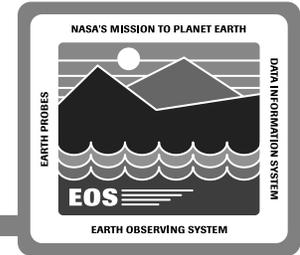
# FOT Interfaces / Functions



# EOC Schedulers

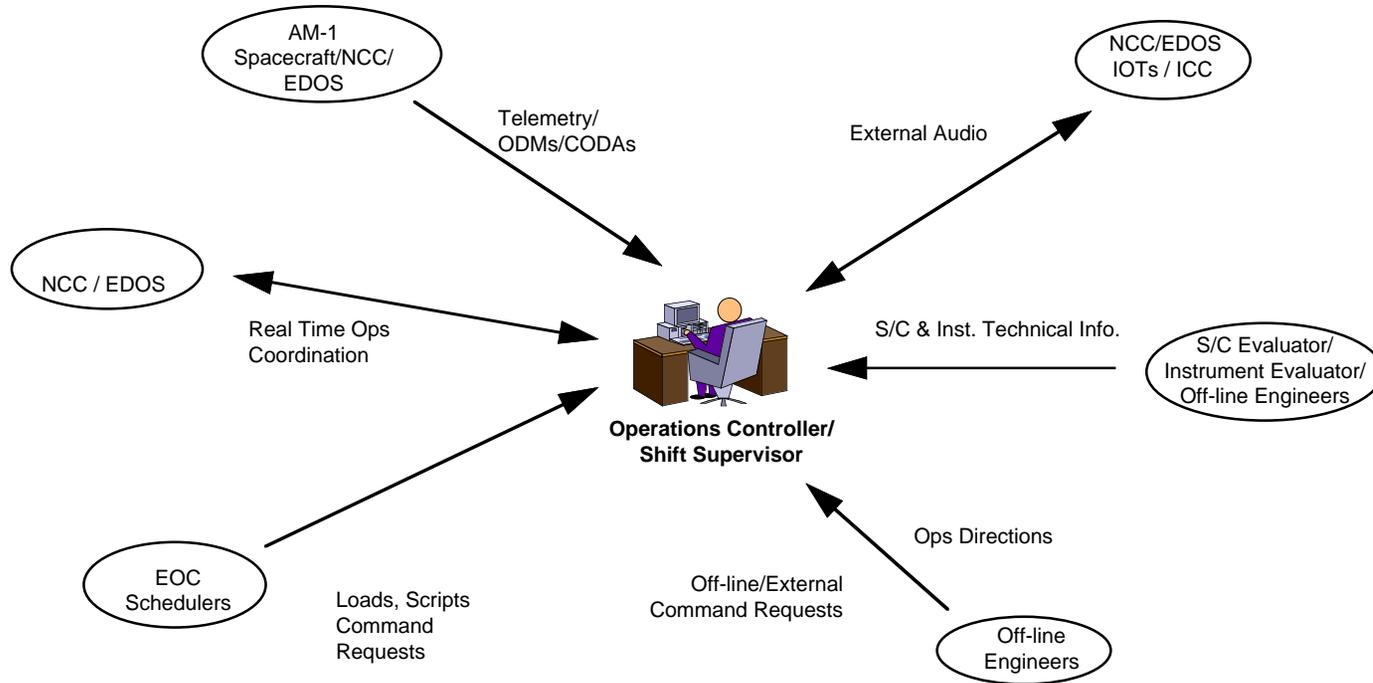
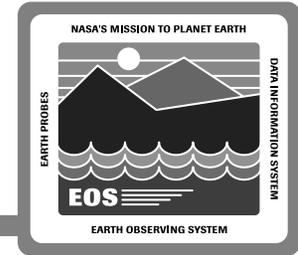


# EOC Schedulers

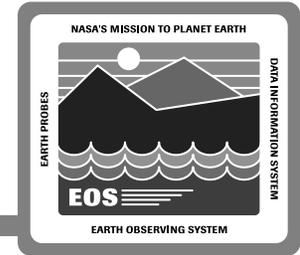


- Perform routine scheduling of Science Instrument requests
- Perform routine scheduling of Space Network resources
- Perform routine scheduling of Spacecraft CDH, High Gain Antenna Real Time(HGA), and SSR
- Perform Daily Activity Plan generation
- Generate Absolute Time Command (ATC) loads for uplink
- Support SN schedule changes and generation of corrective ATC loads
- Support scheduling conflict resolutions
- Support late change requests
- DAR Support
- Activity definition maintenance
- IST request support
- PI/TL interface for conflict resolution

# Ops Controller / Shift Supervisor

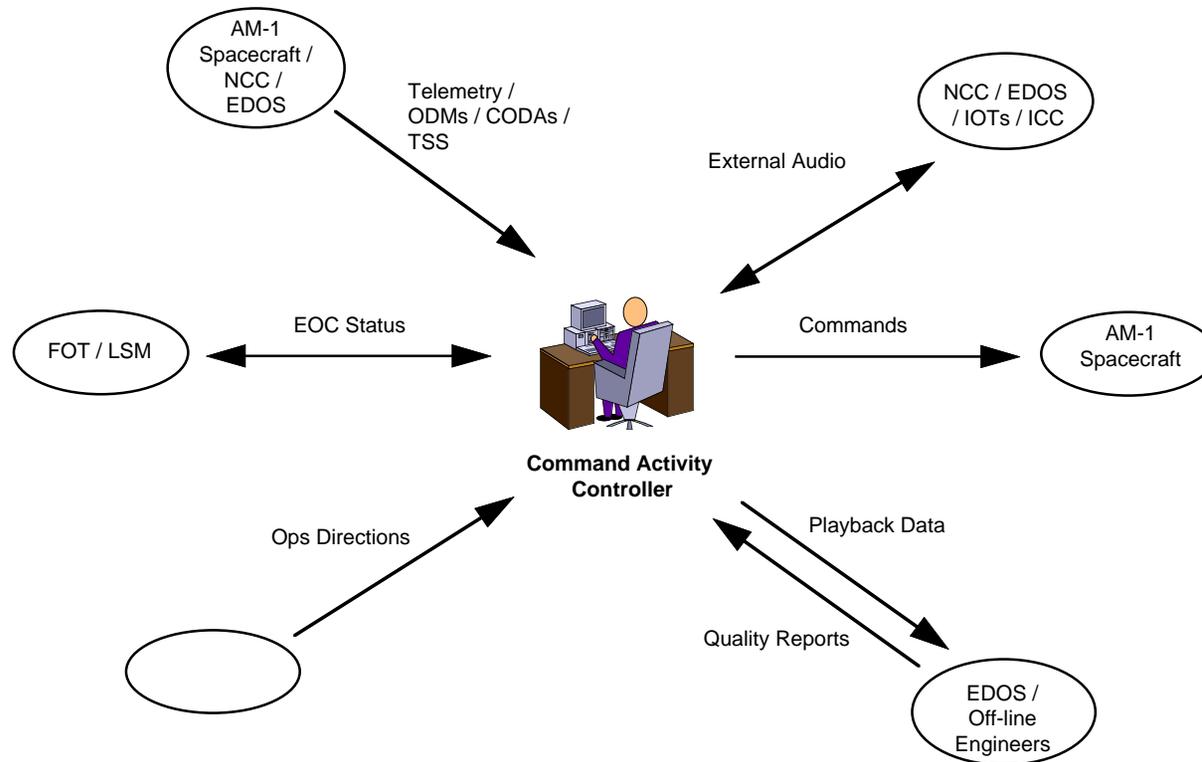
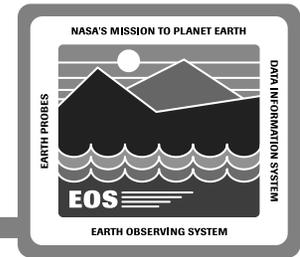


# Ops Controller / Shift Supervisor

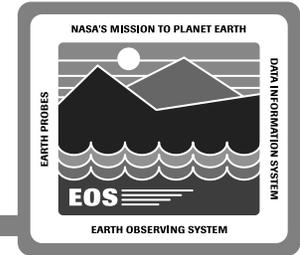


- **Real Time**
  - **Lead on-shift position, performs shift briefings/debriefings**
  - **Lead interface to external and internal elements: NCC, EDOS, IOT**
  - **Leads Real Time anomaly resolution**
  - **Monitors activity timelines**
  - **Approves Real Time command uplinks**
  - **Monitors TDRSS performance data**
  - **Coordinates Real Time scheduling changes**
- **Off-Line**
  - **Maintains shift logs**
  - **Off-shift Scheduling Support, Space Network (SN) resource management, ATC generation**
  - **FOT Management representative during non-prime shifts**

# Command Activity Controller

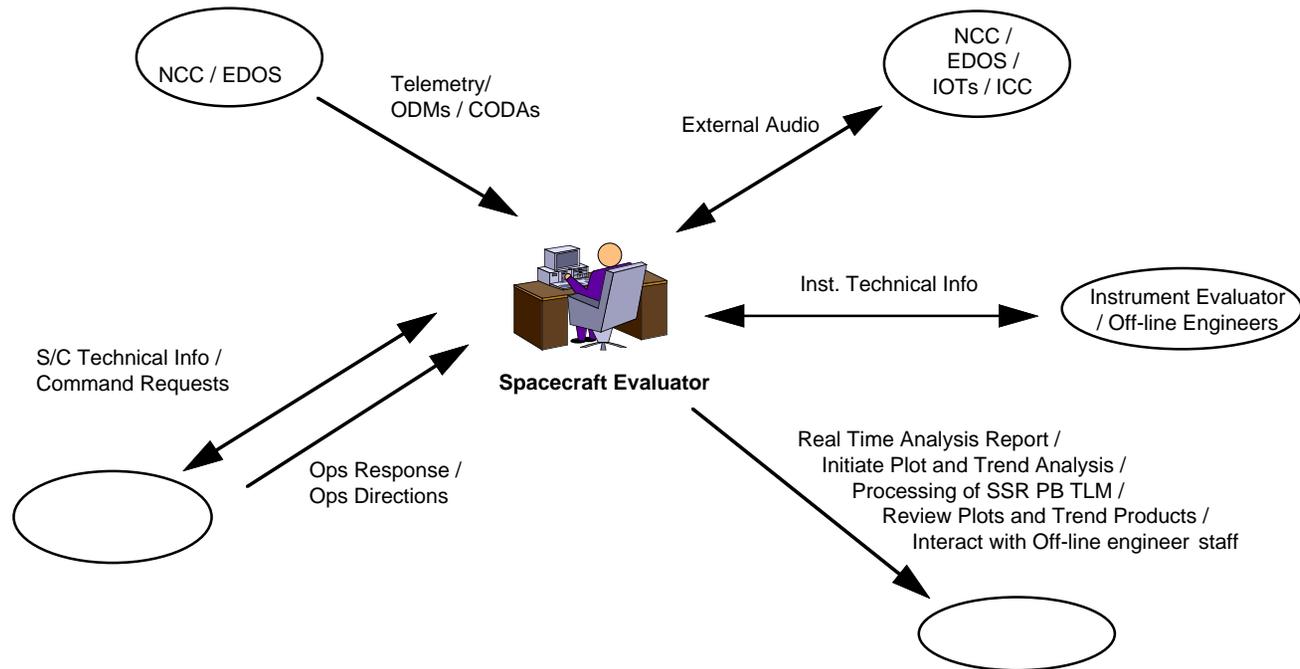
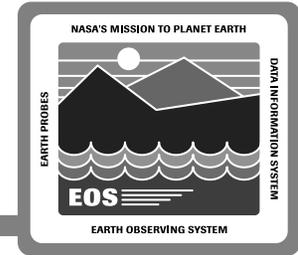


# Command Activity Controller

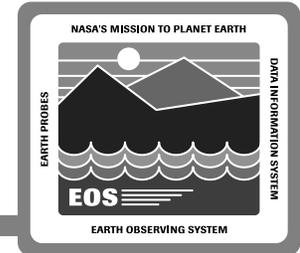


- **Real Time**
  - **Initializes, Monitors and Manages ground system performance**
  - **Transmits commands / loads, TDRSS reconfiguration cmds**
  - **Verifies Command load contents**
  - **Controls & Verifies Ground script execution**
  - **Verifies command and load uplink**
  - **Monitors TDRSS performance data, voice and data lines**
  - **Manages S/C recorder, & monitors playback data quality**
  - **Manages Clock updates**
- **Off-Line**
  - **Reviews Groundscript for upcoming TDRSS support**
  - **Manages History log archival**

# Spacecraft Evaluator

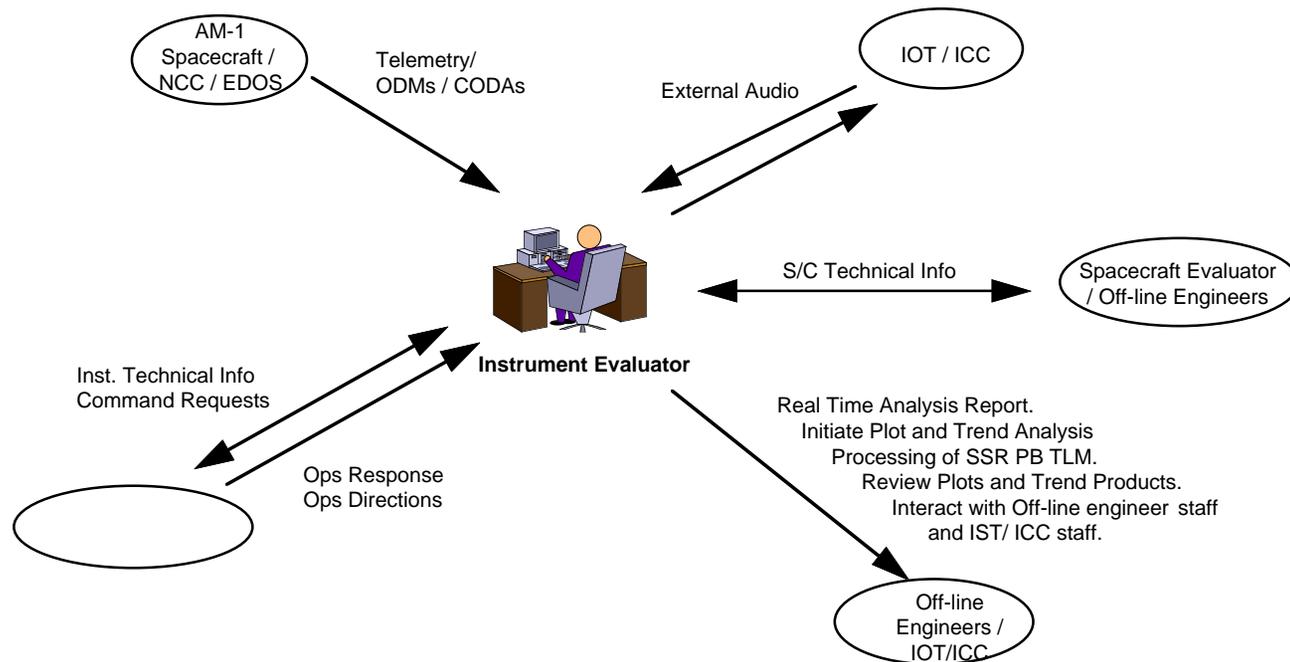
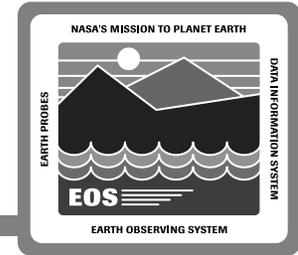


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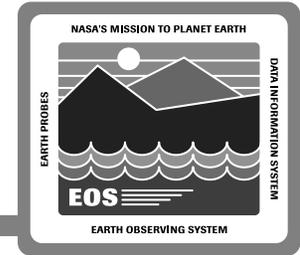


- **Real Time**
  - **Monitors and Verifies** ground script execution, Spacecraft subsystem health and safety, Clock drifts, TDRSS ground station performance data, FDF RTADS, Alarms and Limits, and S/C Recorder Management
  - **Requests and reviews S/C activity log**
  - **Reviews, monitors, supports command activity**
  - **S/C anomaly recognition**
- **Off-Line**
  - **Reviews Groundscript** for upcoming TDRSS events
  - **Supports Subsystem Performance and Trend analysis**
  - **Supports Off-line engineering analysis activities**

# Instrument Evaluator

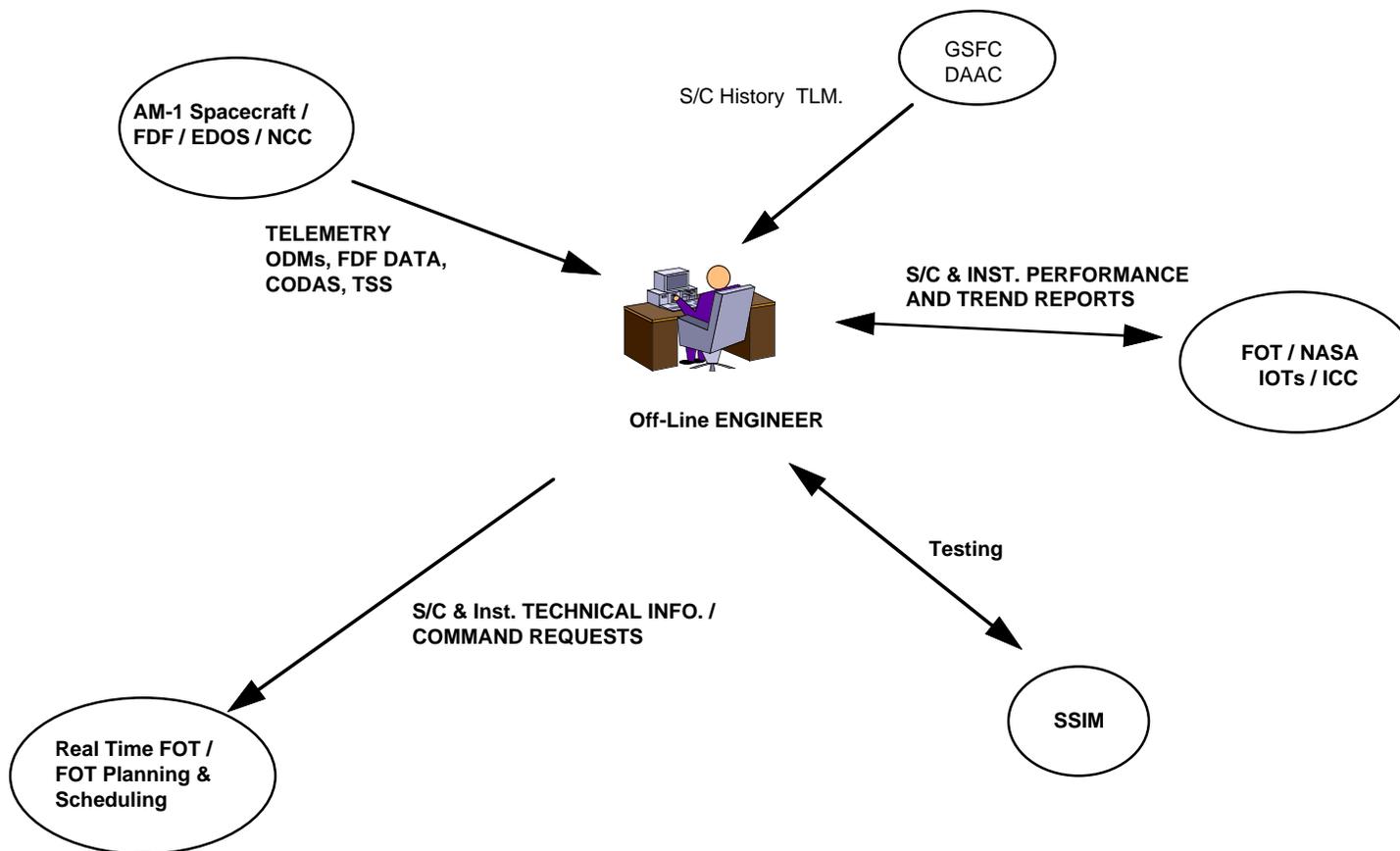
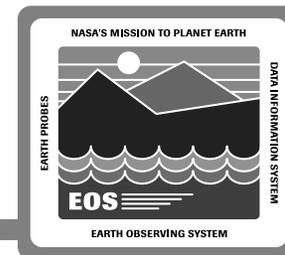


# Instrument Evaluator

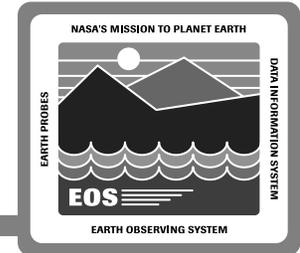


- **Real Time**
  - **Monitors ground script, and health / safety of instruments**
  - **Monitors/verifies instrument command activity**
  - **Requests and reviews S/C activity log**
  - **Reviews, monitors, supports command activity**
  - **Review alarms and limits**
  - **Coordinates instrument command uplink with IOTs and shift supervisor**
  - **Instrument anomaly recognition**
- **Off-Line**
  - **Reviews Groundscript for upcoming TDRSS events**
  - **Supports Instrument Performance and Trend Analysis from S/C recorder playback data**
  - **Supports Off-line engineering analysis activities.**

# Off-Line Engineers



# Off-Line Engineers



- **FOT technical expert for assigned subsystem**
- **Responsible for subsystem health and safety**
- **Plans and executes all subsystem special/critical activities**
- **Performs subsystem Performance and Trend Analysis**
- **Performs Trend analysis of assigned subsystem**
- **Supports Lead Systems Engineer in subsystem anomaly resolution**
- **Provides technical support to Real Time operations.**
- **Provides technical support to Planning and Scheduling.**
- **Leads subsystem command procedure development**