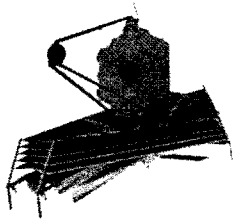


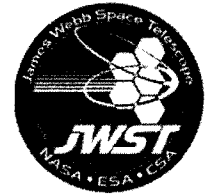
Agenda



- What is GS&O I&T
- Organizations involved
- GS&O Testing of Facility and Systems
- Network and Computer Security
- OSS Testing
- GS&O I&T Training
- Summary

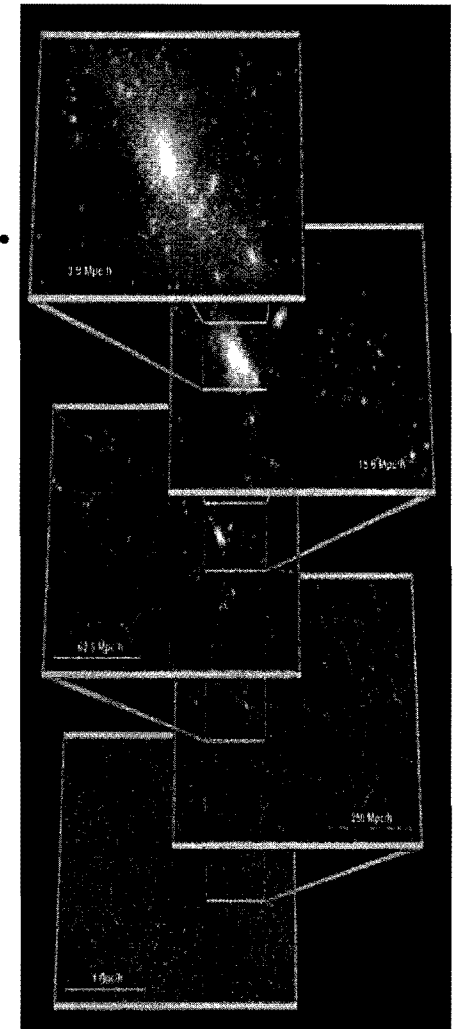


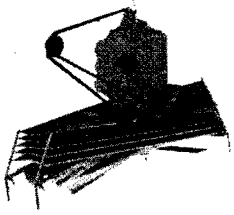
What is GS&O I&T



- Brings together and tests various organization contributions and systems into a single operations for JWST.
 - NISN for data distribution
 - GSFC for ISIM I&T and management
 - JSC for pathfinder and OTE/ISIM I&T
 - NGAS for spacecraft and observatory I&T
 - FDF for orbit information
 - DSN for command and telemetry
 - SN for command and telemetry
 - ESA for launch, command and telemetry
 - Launch Site,
 - SOC for I&T and operations
 - Network and Computer Security

GS&O I&T May 2009
JWST-PRES-012867





What is GS&O I&T

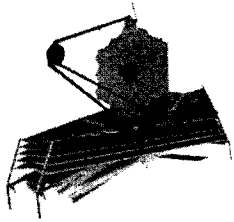


- Responsible for testing, reporting, readiness, and troubleshooting support for I&T and Operations
 - Voice communications
 - Data communications
 - Video communications
 - OSS on board scripts and GS&O procedures

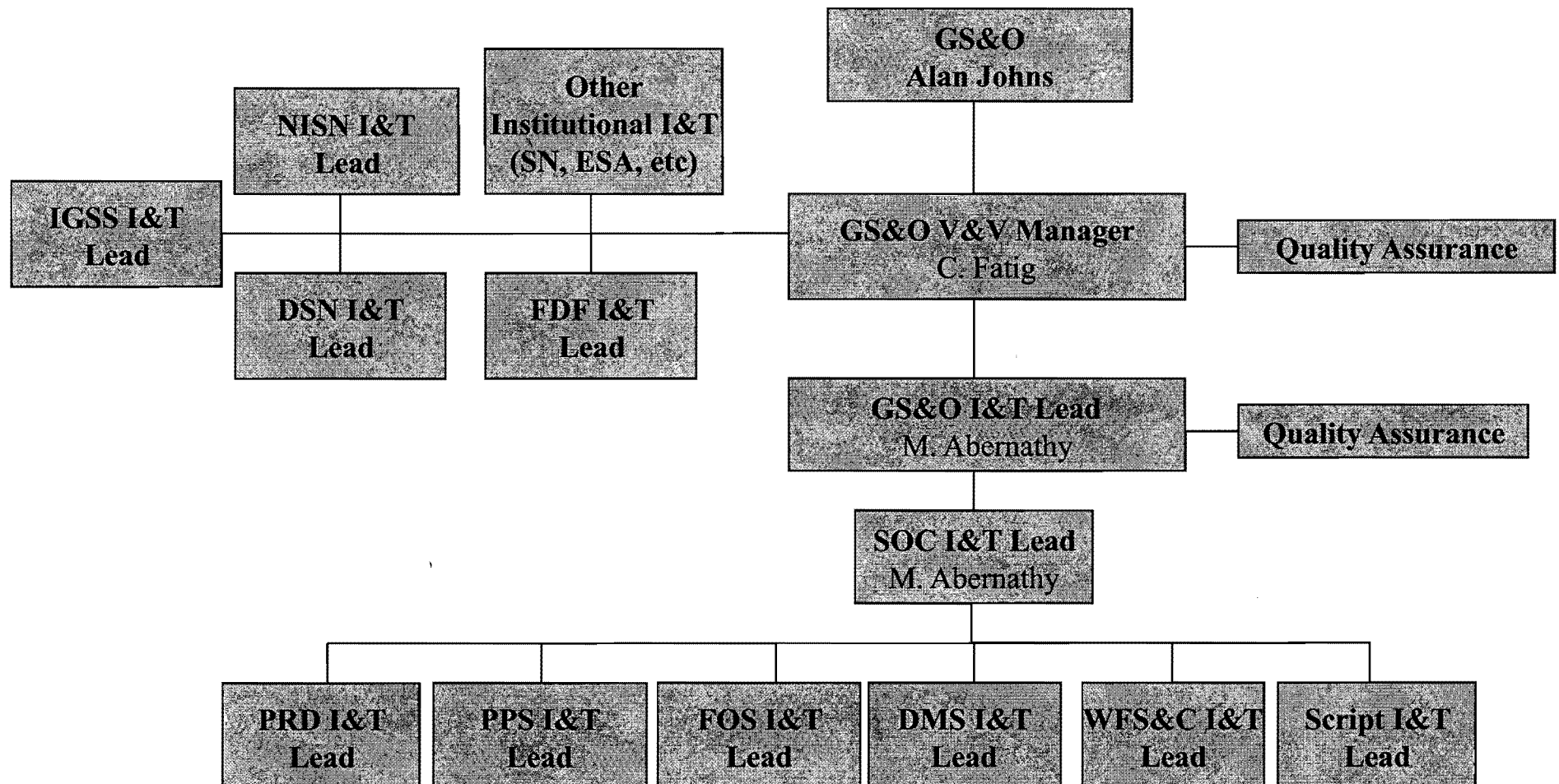
- I&T Ground Systems (JLAB rack)
 - Eclipse (CCTS), IGSS tools, File servers

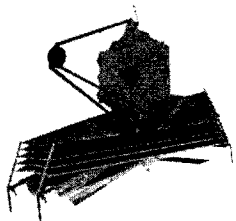
- SOC Ground System
 - FOS, PPS, DMS, OPGS, WFS&C, PRDS

- Institutional Systems
 - DSN, ESA, SN, FDF, NISN



GS&O I&T Organization





GS&O I&T-NISN



➤ I&T Ground Network

- Telemetry
- Commands
- File data, internal and external access
- Internet access
- I&T Sites; GSFC, JSC, NGAS, Launch Site

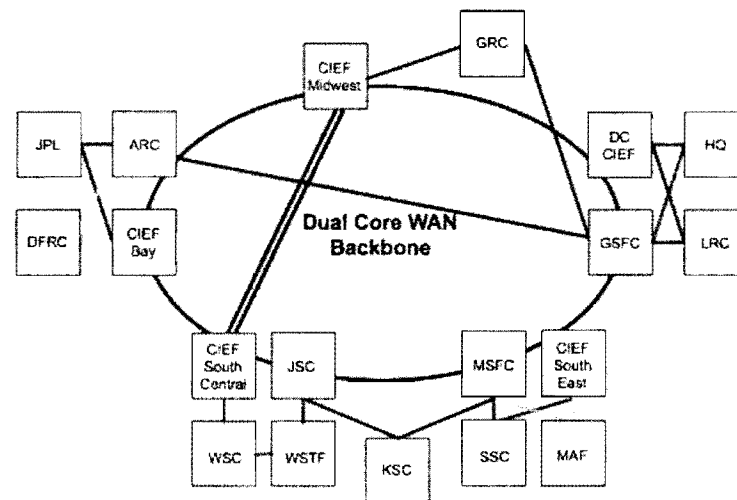


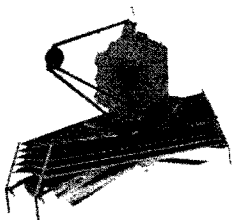
➤ Operational Ground Network

- Telemetry
- Commands
- File data, internal and external access
- Internet access
- Operational Sites; STScI, DSN, ESA, SN

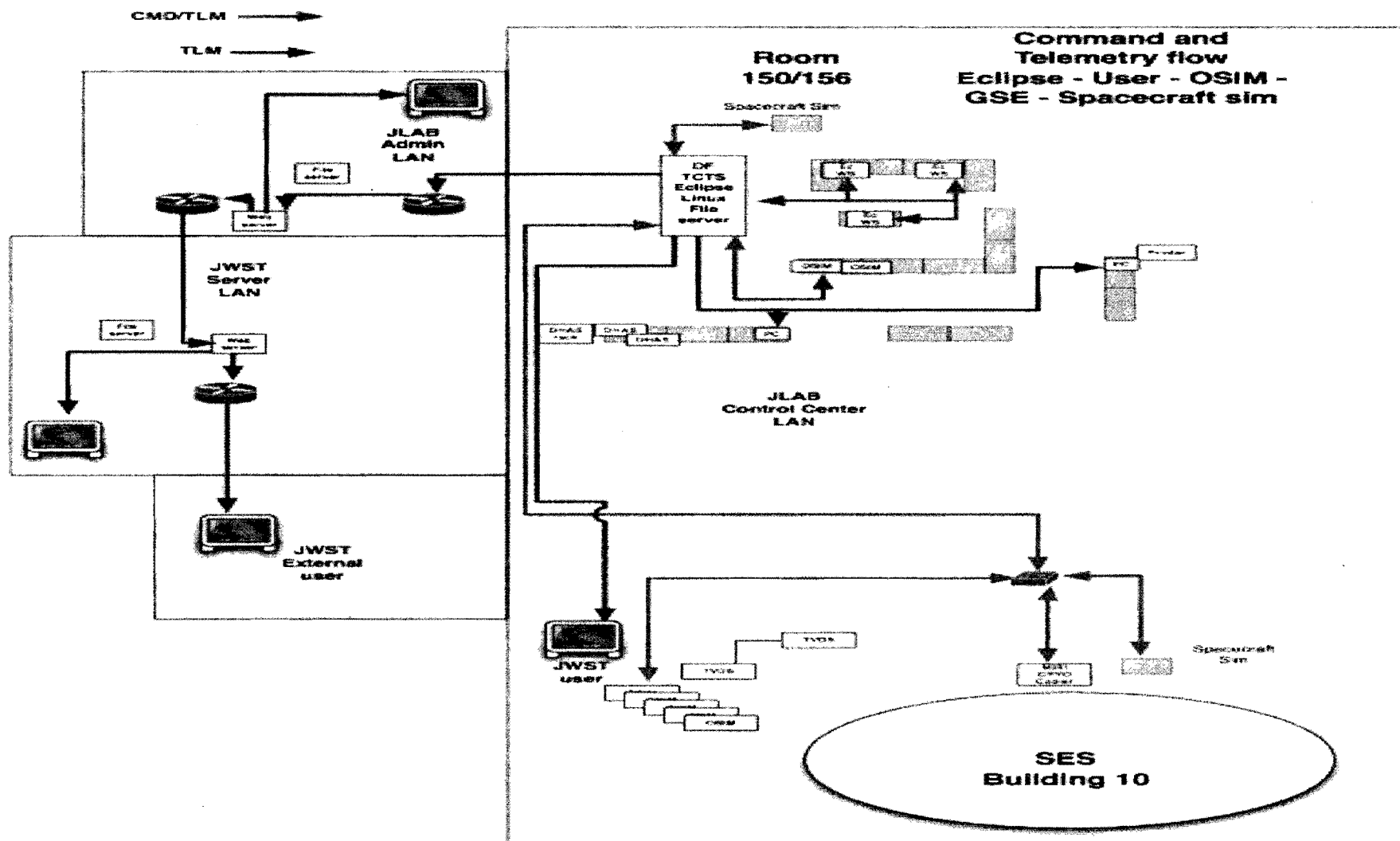
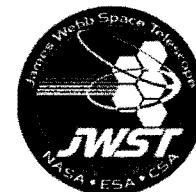
➤ Voice

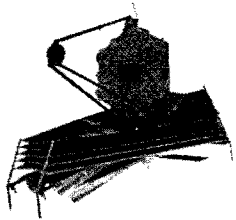
- Mission Voice system
 - Used at both I&T and Operations



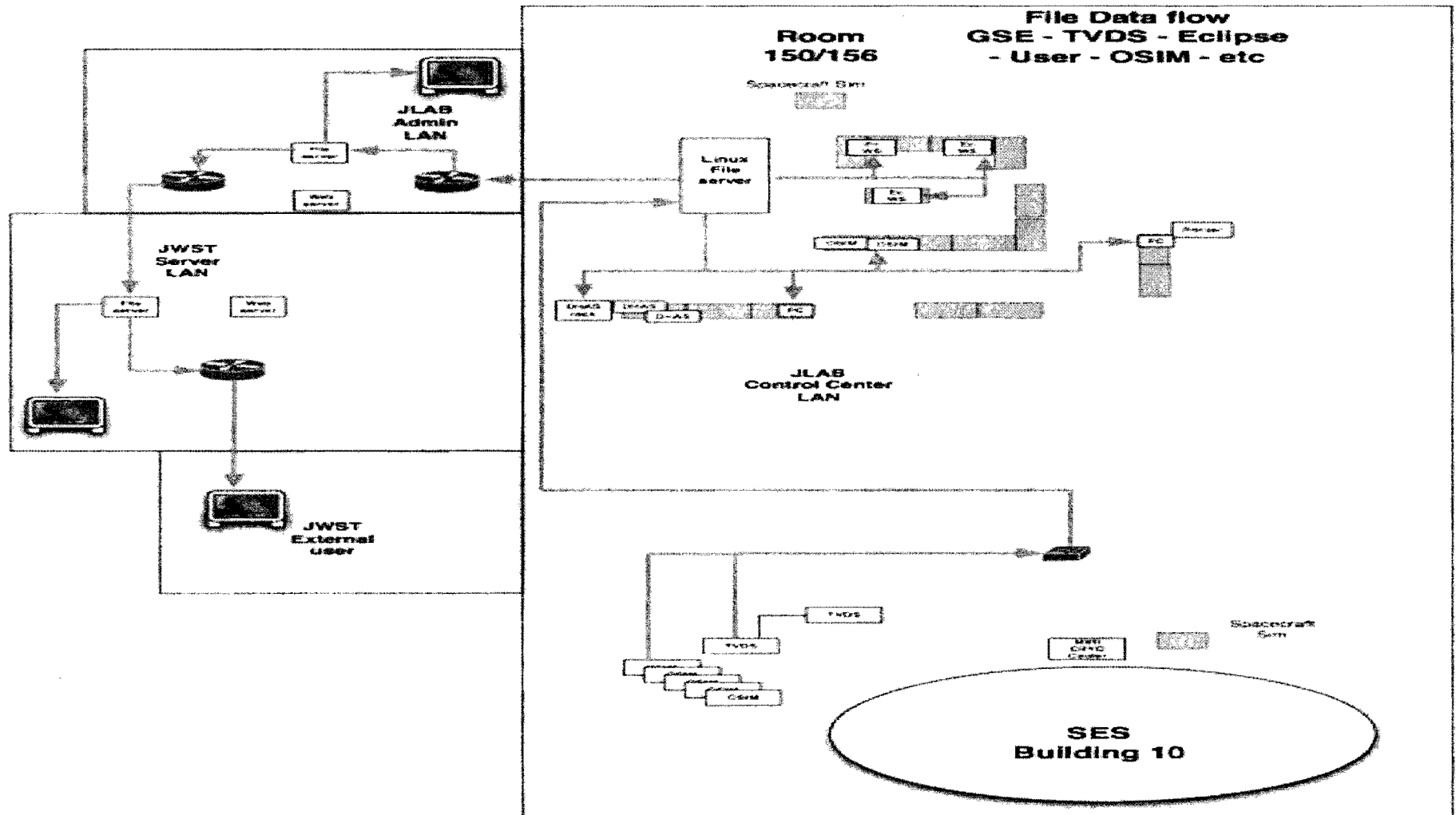


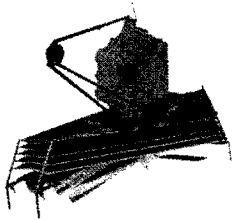
Sample CMD/TLM Flow



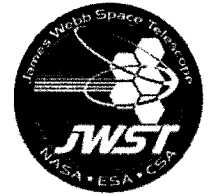


Sample File Data Flow





GS&O I&T-GSFC



➤ ISIM I&T

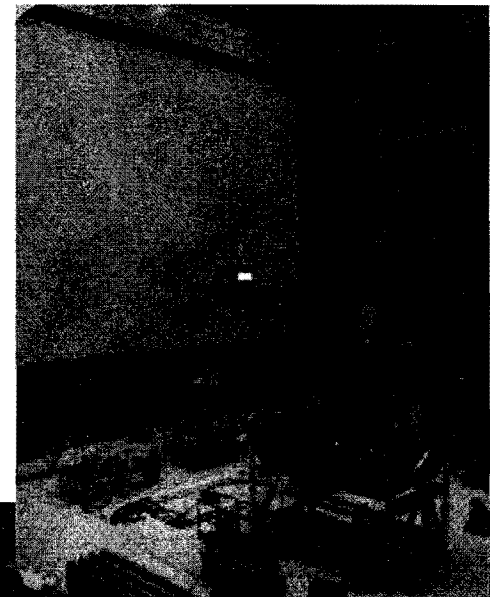
- Telemetry
- Command
- Voice
- Network
- File data, internal and external access
- JLAB (Eclipse, IGSS, GSE, etc)

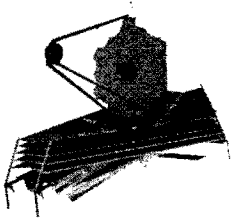
➤ Data Storage

- Access
- Short Term
- Long Term

➤ Test Management

- Test Plans and Procedures
- Test Reviews and Approvals
- Test Status and Reports
- Requirements Tracking





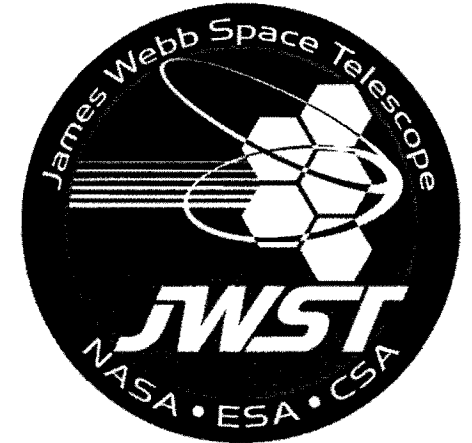
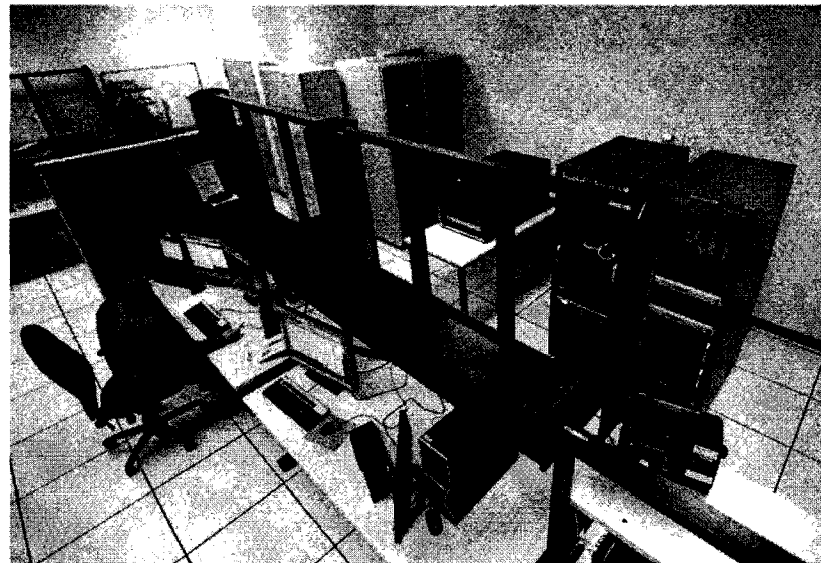
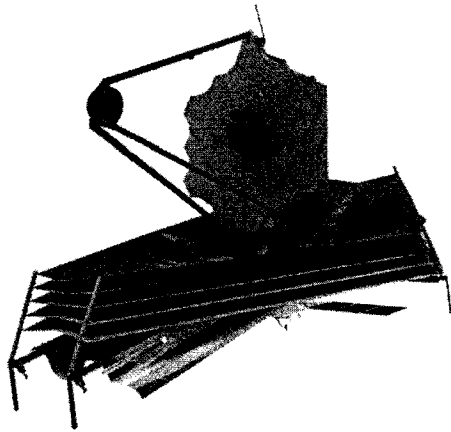
GS&O I&T Test Objectives at GSFC

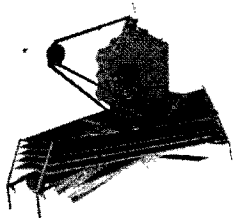


- **SI Commissioning**
- **WFS Maintenance**
- **End-to-End Science Instrument Data Flow Tests**
- **Day in the Life Test**

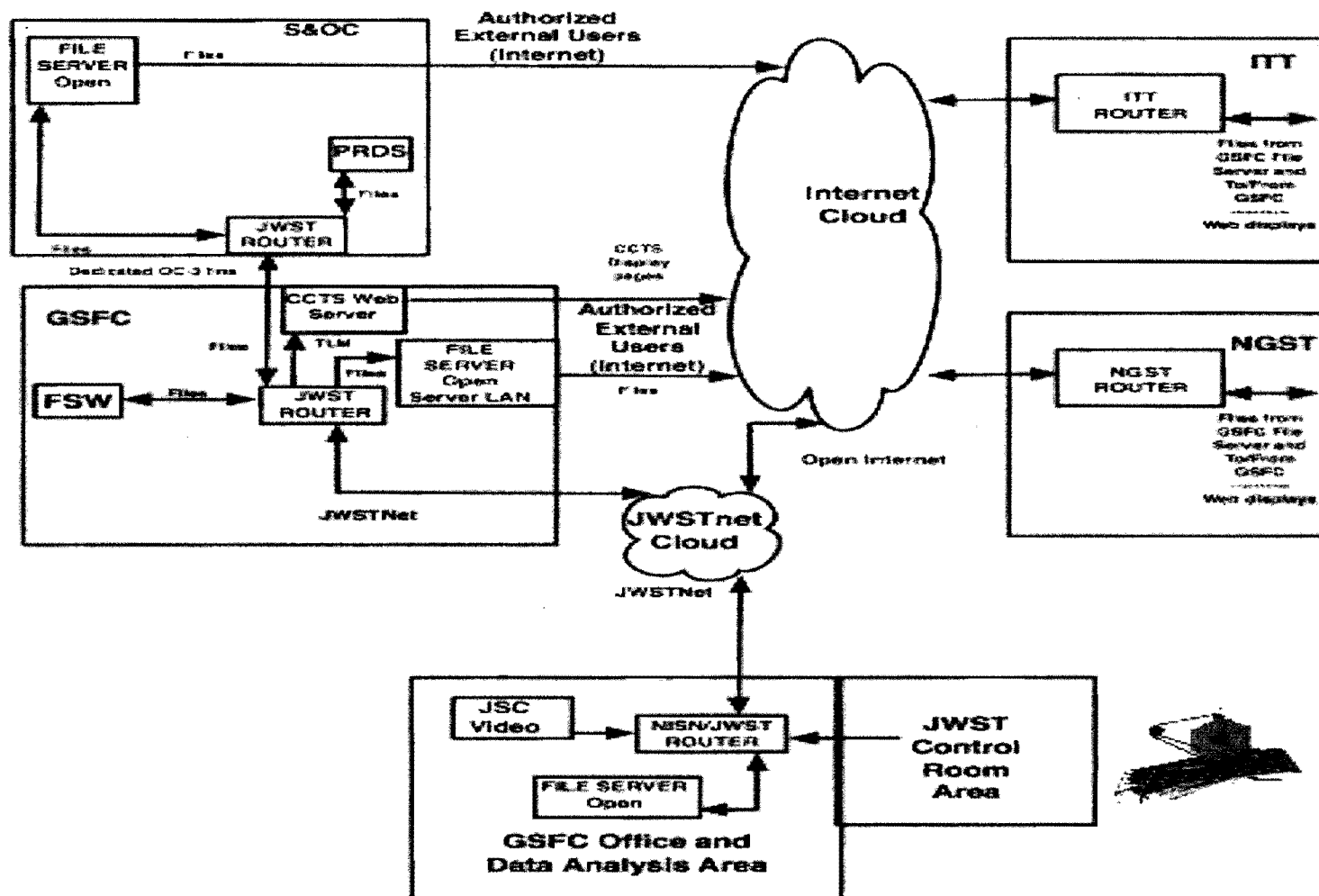
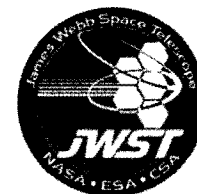
JWST Ground Segment and Operations Integration and Testing

May 2009

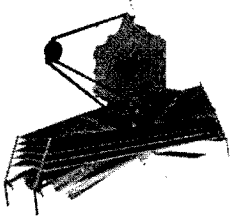




GS&O I&T Layout at GSFC



JWST Hardware



GS&O I&T-JSC



➤ Sunshield

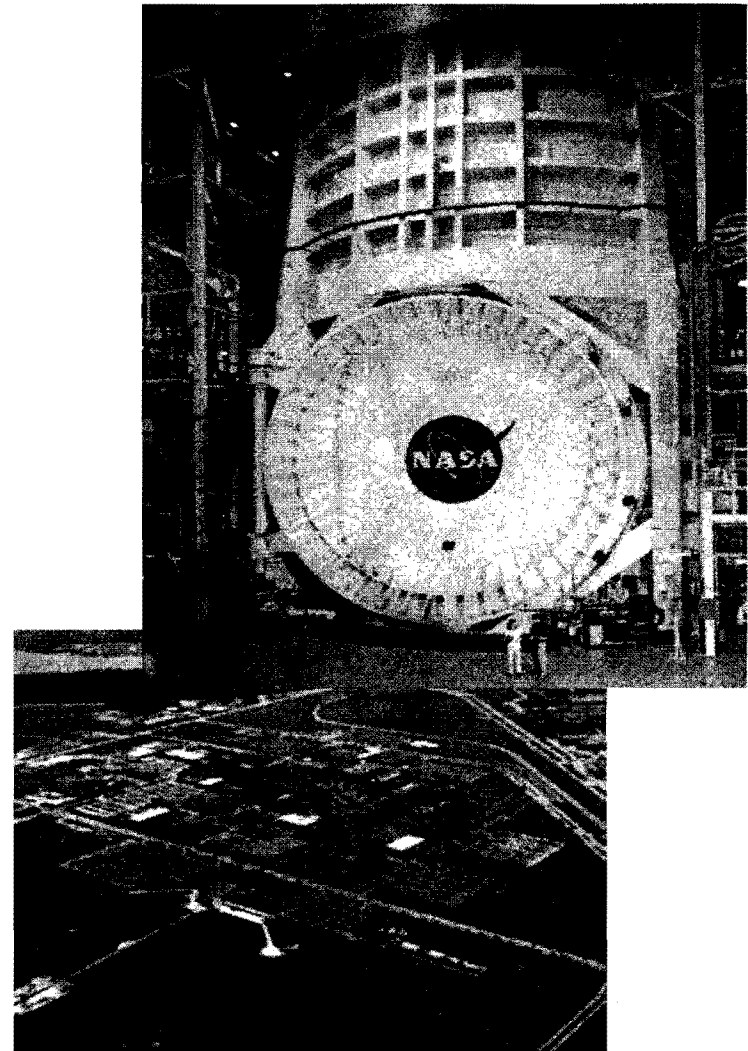
- File data, internal and external access
- Internet access

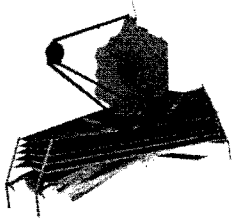
➤ Pathfinder

- File data, internal and external access
- Internet access

➤ OTE/ISIM

- Telemetry
- Commands
- File data, internal and external access
- Internet access
- Voice
- Network
- JLAB (Eclipse, IGSS, GSE, etc)

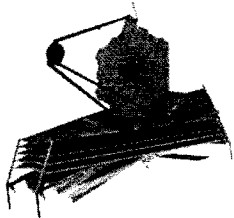




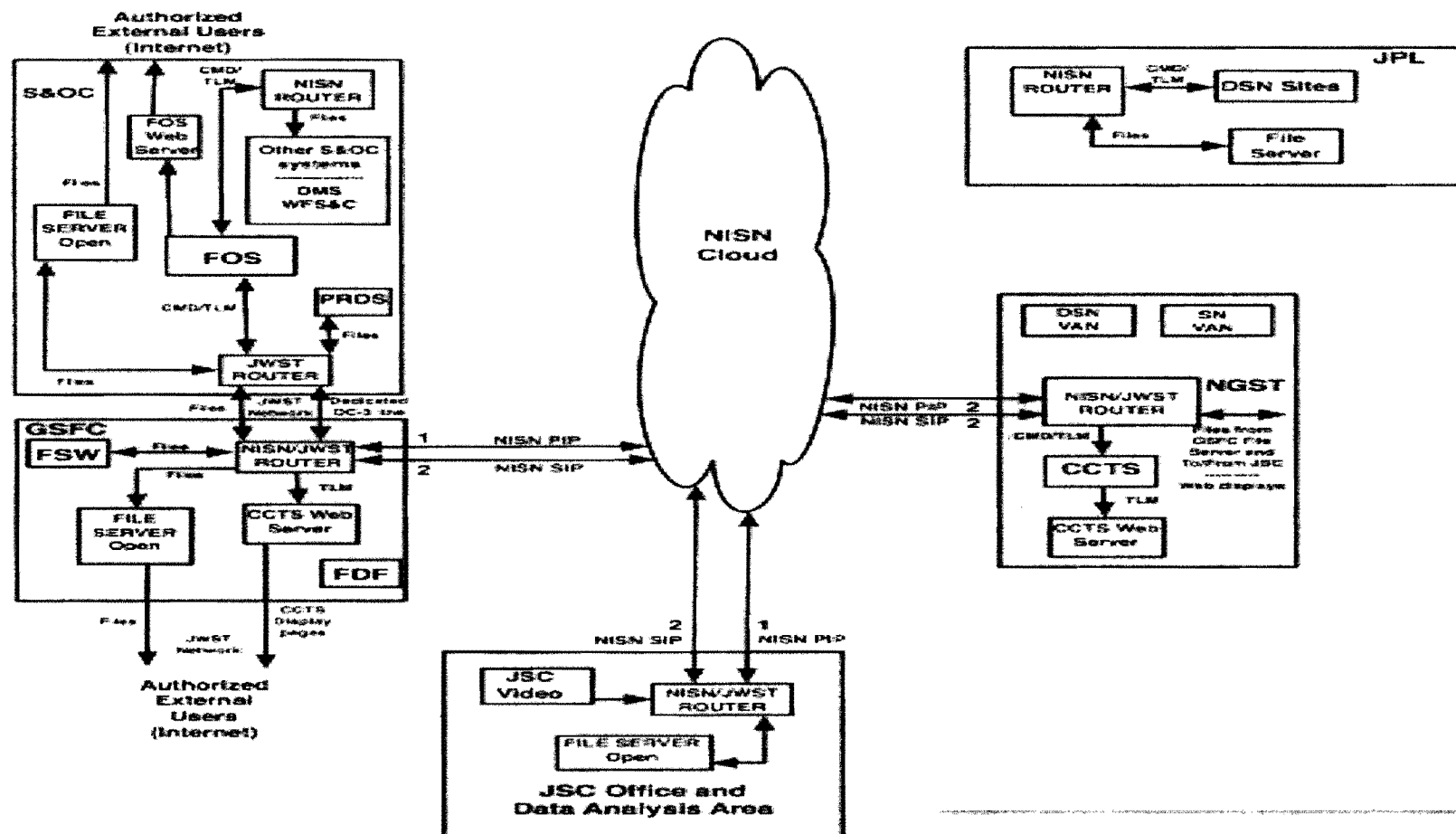
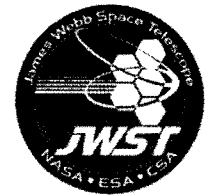
GS&O I&T Test Objectives at JSC



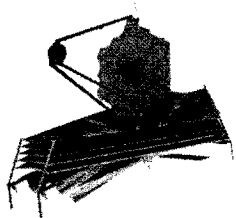
- **Observatory Commissioning**
- **WFS&C Commissioning**
- **Open Loop Target Acquisition Tests**
- **Open Loop Guide Star Acquisition Tests**
- **WFS&C Maintenance**
- **End-to-End Science Instrument Data Flow Tests**
- **Day in the Life Test**
- **End-to-End Science Instrument Data Flow Warm-Up Tests**



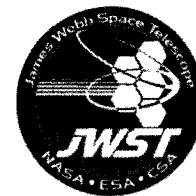
GS&O I&T Layout at JSC



JWST Hardware

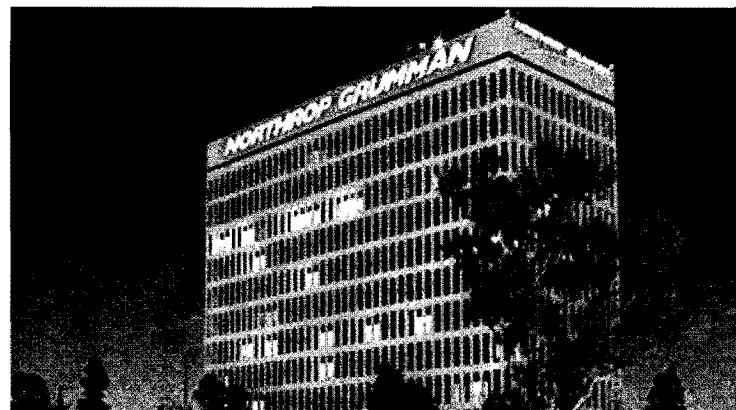


GS&O I&T-NGAS



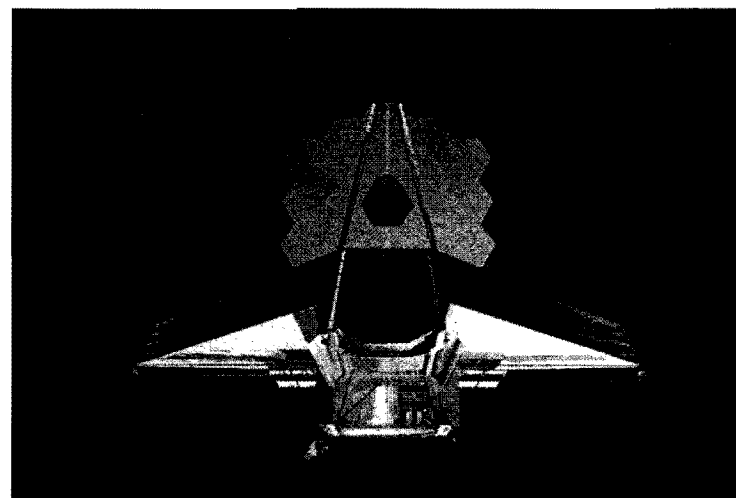
➤ Spacecraft

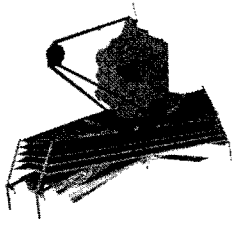
- Participate in compatibility Testing; DSN and SN
- Telemetry
- Commands
- File data, internal and external access
- Internet access
- Voice
- External Access
- JLAB (Eclipse, IGSS, GSE, etc)



➤ Observatory

- Telemetry
- Commands
- File data, internal and external access
- Internet access
- Voice
- External Access
- JLAB (Eclipse, IGSS, GSE, etc)

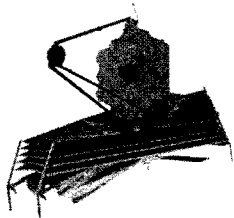




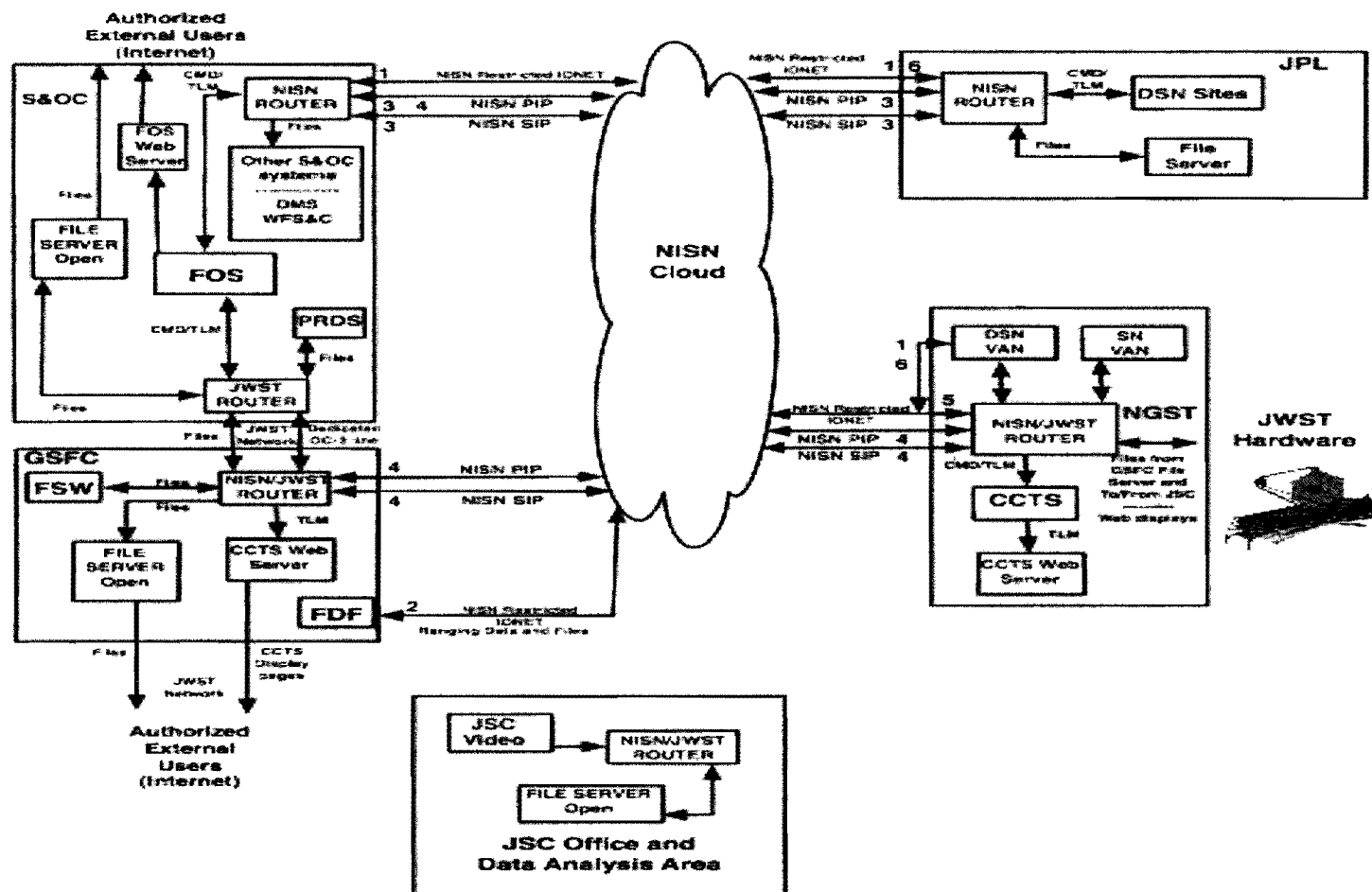
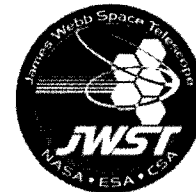
GS&O I&T Test Objectives at NGAS

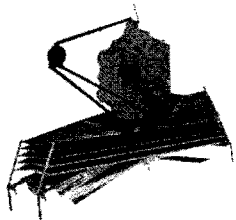


- **SI Ambient Checkout/Data Flows**
- **End-to-End Spacecraft Data Flow Tests**
- **Day in the Life Test (Ambient)**
- **SO&C Testing with Spacecraft**
- **DSN Compatibility Testing**

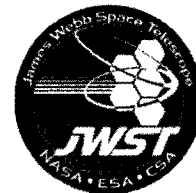


GS&O I&T Layout at NGAS





GS&O I&T-FDF



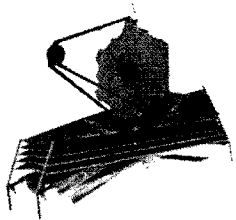
➤ Interface and Product

- FDF and DSN
- FDF and SOC
- File data
- Voice

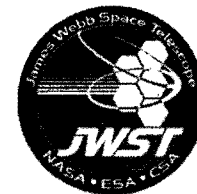


➤ Testing at FDF

- DSN Compatibility Testing
- SOC Compatibility Testing
- SOC Product Testing



GS&O I&T-DSN



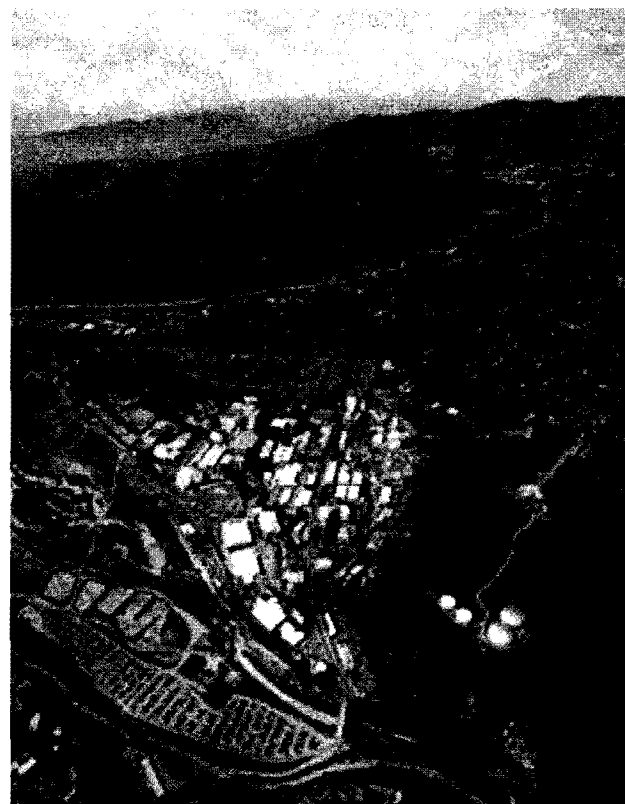
➤ JPL to SO&C

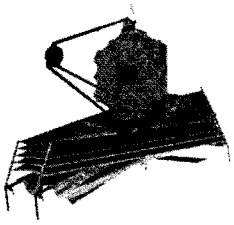
- Participate on NGAS compatibility Testing; DSN
- Telemetry
- Commands
- File data
- Voice
- Scheduling



➤ DSN Sites

- Telemetry
- Commands
- File data
- Voice
- Proficiency testing

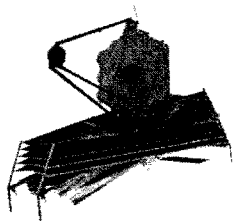




GS&O I&T Test Objectives at DSN



- **Spacecraft Compatibility Testing**
 - Including CFDP data processing
- **SOC Compatibility Testing**
 - Including CFDP data processing
- **Site Proficiency Testing**
- **Launch Readiness Testing**



GS&O I&T-SN



➤ SN to SO&C

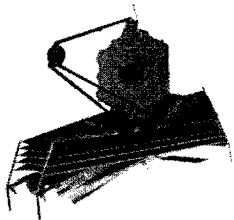
- Participate on NGAS compatibility Testing; SN
- Telemetry
- Commands
- Voice
- Scheduling



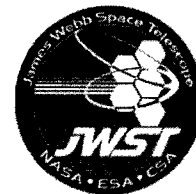
➤ Testing at SN

- Spacecraft Compatibility Testing
- SOC Compatibility Testing
- Proficiency Testing
- Launch Readiness Testing



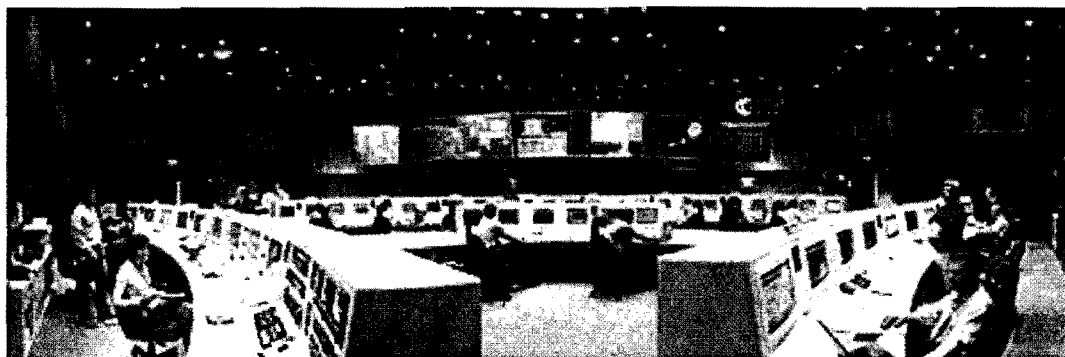


GS&O I&T-ESA



➤ ESA to SO&C

- Participate on NGAS compatibility Testing; at ESA
- Telemetry
- Commands
- Voice
- Scheduling



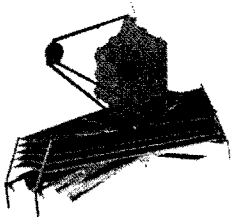
➤ ESA Site

- Telemetry
- Commands
- Voice
- Proficiency testing

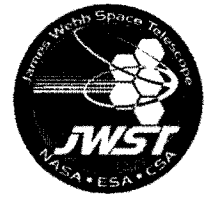
➤ Testing at ESA

- Spacecraft Compatibility Testing
- SOC Compatibility Testing
- Site Proficiency Testing
- Launch Readiness Testing



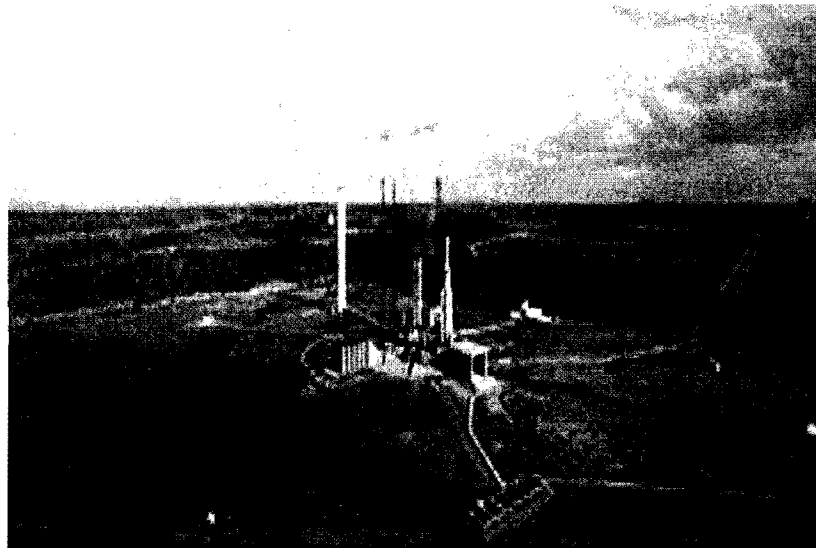


GS&O I&T-Launch Site



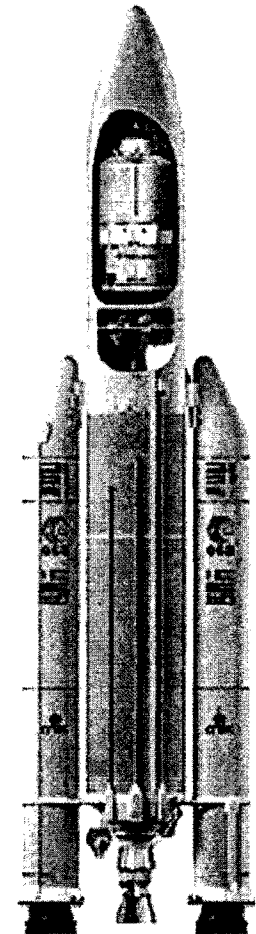
➤ Launch to SOC

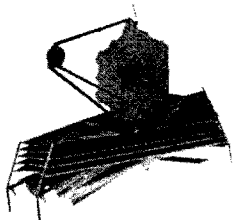
- Participate on NGAS Testing
- Telemetry
- Commands
- Voice
- Admin data



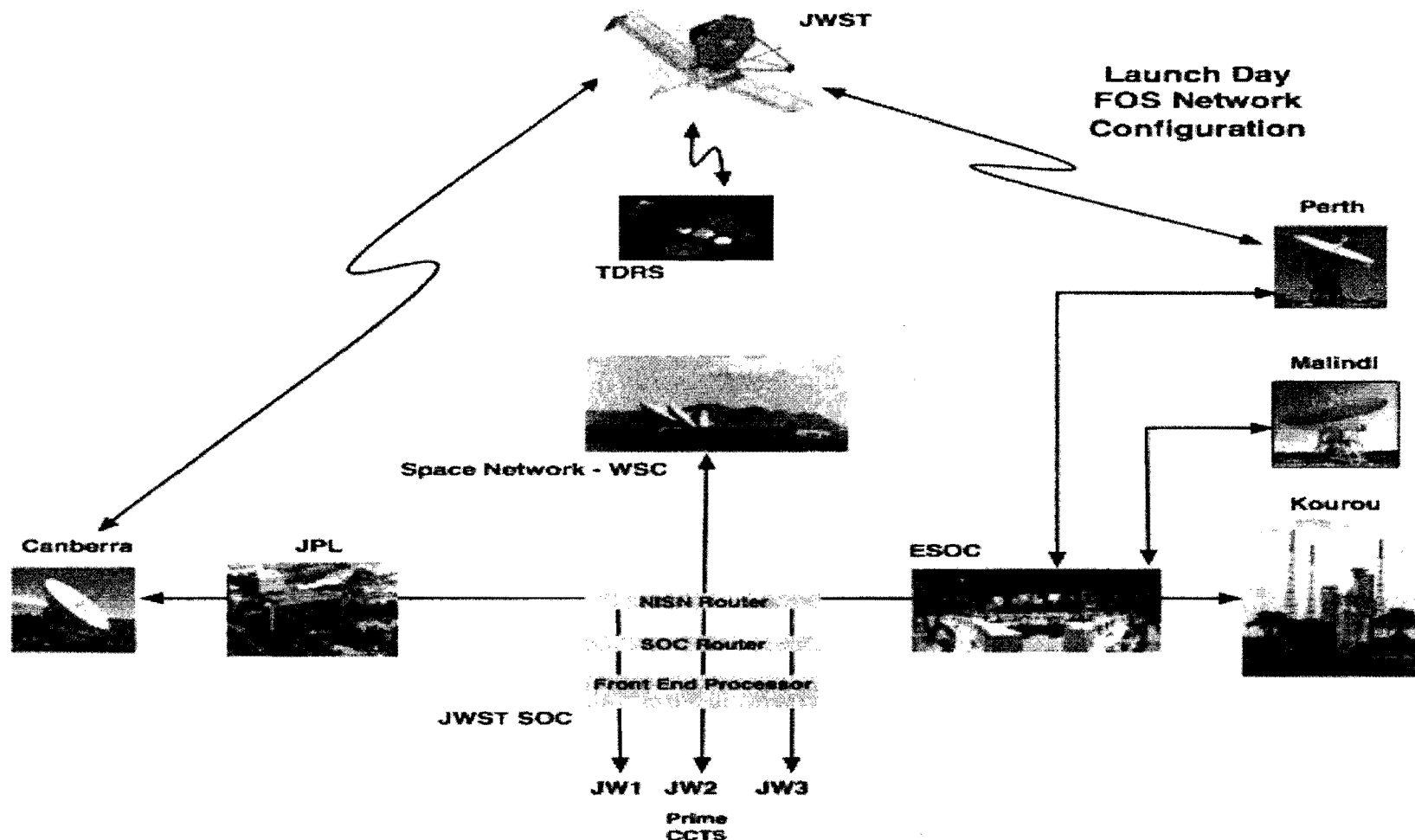
➤ Testing at Launch Site

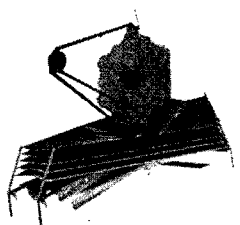
- Spacecraft Compatibility Testing
- SOC Compatibility Testing
- Launch Readiness Testing



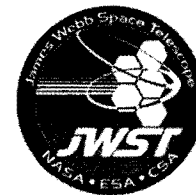


GS&O Launch Day





GS&O I&T-SOC

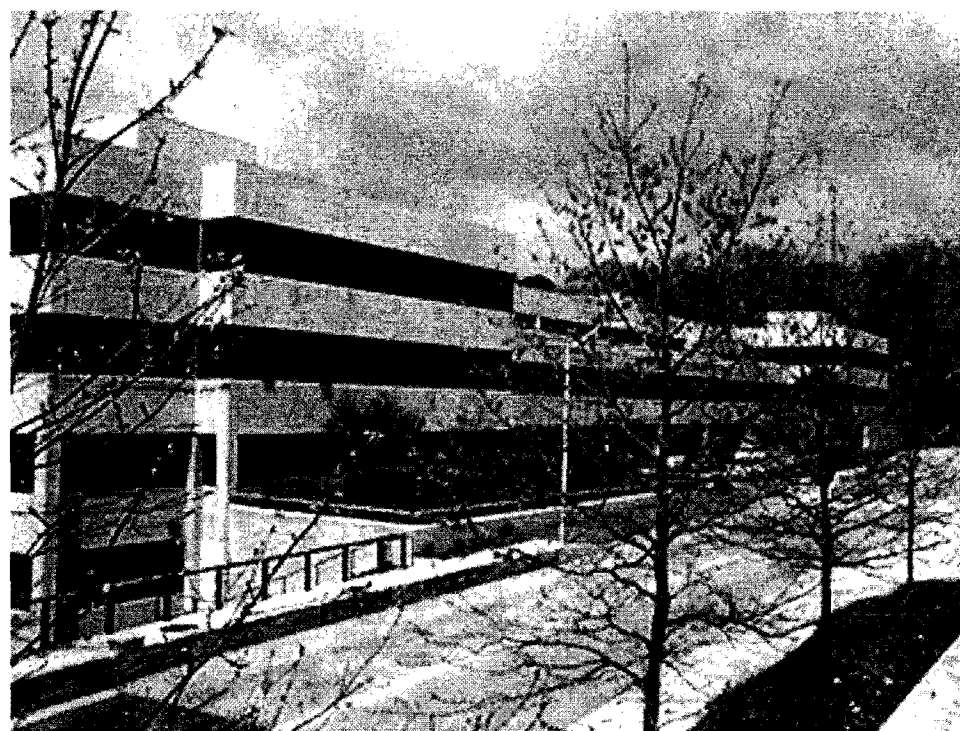


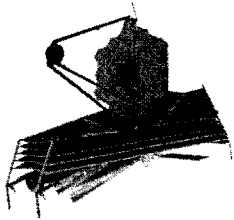
➤ Interfaces

- DSN
- FDF
- ESA
- SN
- Internet access
- Voice
- External Access

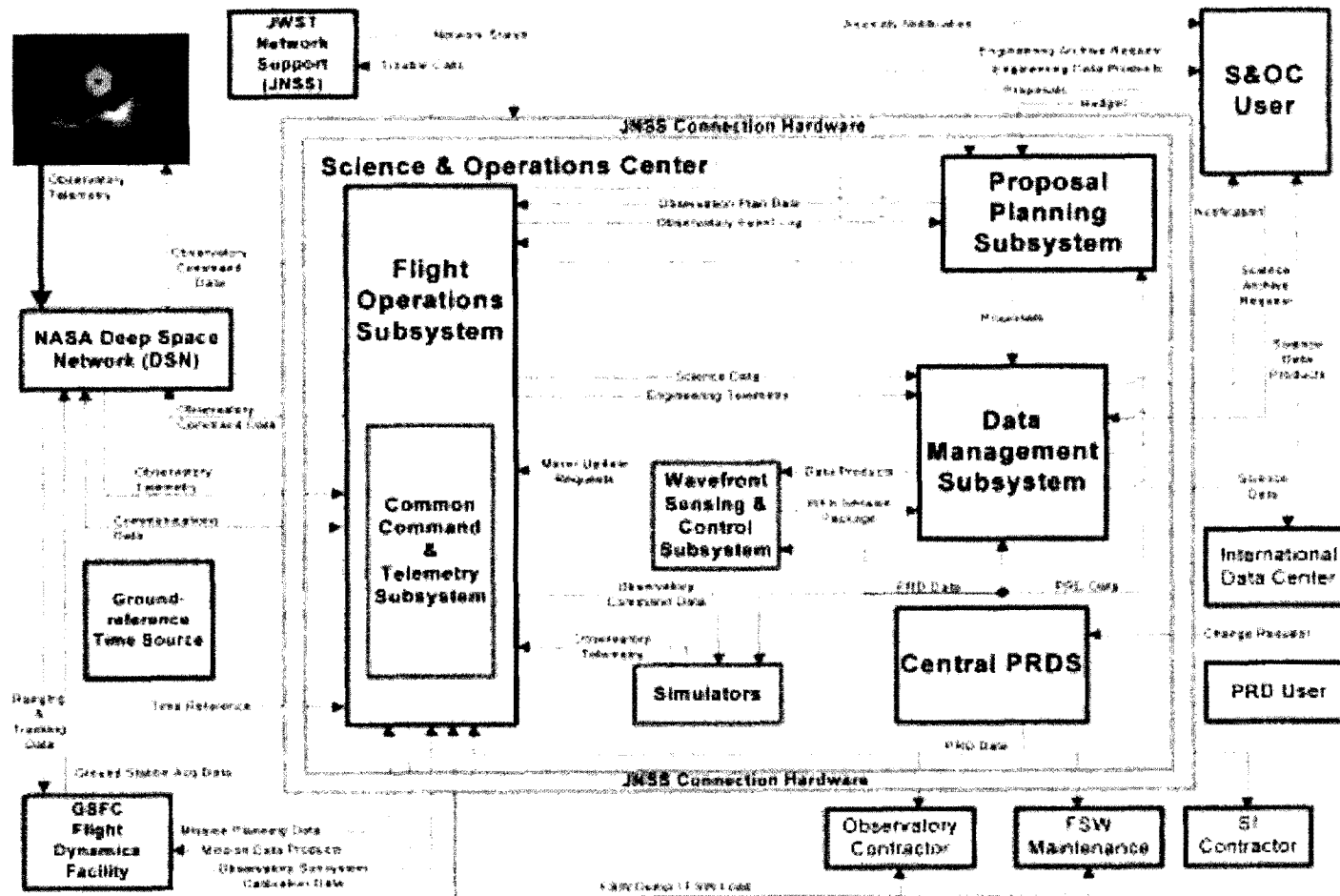
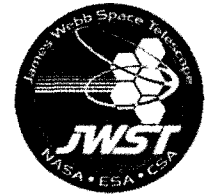
➤ SOC Systems

- DMS
- PPS
- WFS&C
- OPGS
- FOS
- PRDS



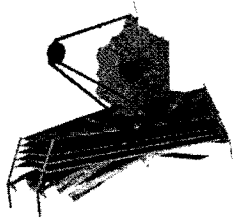


GS&O I&T Layout at SOC



*Shown is fully Operational System

GS&O I&T May 2009
JWST-PRES-012867

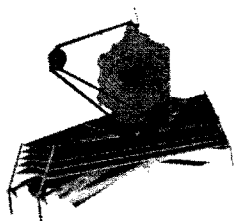


GS&O I&T Test Objectives at SOC_{1/3}



➤ Network and Computer

- The Observing Cycle
- The Observing Plan Cycle
- Reprogramming of Telemetry Downlinks
- Flight Software Maintenance
- Ephemeris Management
- Contact Schedule Management
- Perform Attended Flight Operations
- Perform Daily Contact
- On-board Clock Synchronization
- Science Instrument Characterization
- Routine Wavefront maintenance
- Orbit Maintenance and Momentum Management
- Manage PRD
- Science Data Processing
- Science Data Retrieval and Distribution
- Engineering Telemetry Data Processing
- Solid State Recorder Management
- High Gain Antenna Pointing
- Observatory Sustaining Engineering
- Unattended Operations
- SOC Test Support
- SOC Launch & Ascent Support
- Observatory Recovery after Safing
- SI Recovery after Safing
- Spacecraft Safing
- Failover to Back-up of SOC Systems
- Failover to Alternate SOC Facility
- Adherence to CARD and OLD
- SOC Archive
- Operational Data Rates
- Peak Loads
- Units



GS&O I&T Test Objectives at SOC_{2/3}

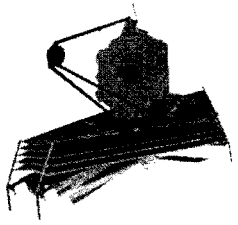


➤ **Ground Segment Mission Operations Testing**

- Support JWST Launch and Deployment
- Support JWST Commissioning
- WFS&C Commissioning
- Two weeks in the life of JWST
- Certification of PRD data products to be used

➤ **Testing of SOC Subsystems Internal Interfaces**

- Proposal Planning Subsystem
- Flight Operations Subsystem
- Data Management Subsystem
- Observatory Plan Generation System
- Wave Front Sensing and Control Subsystem
- Project Reference Database Subsystem

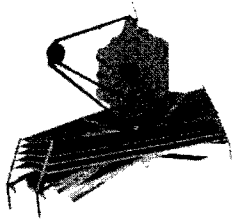


GS&O I&T Test Objectives at SOC_{3/3}



➤ Testing of SOC Subsystem External Interfaces

- NISN
- DSN
- SN
- ESA
- I&T Sites
- FDF
- SOC User
- International Data Center
- Central Time Source
- FSW Maintenance Facility
- Spacecraft Contractor
- SI Contractors
- Proposers
- Public Affairs

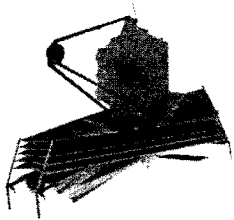


GS&O I&T

Network and Computer Security



- **Network and Computer**
- **This applies to all IT resources and information systems that store, process or transmit NASA data, or that connect to NASA networks or systems, or that are located on NASA facilities.**
 - This covers all areas of the NASA IT environment, including IT infrastructure services, and IT applications.
 - Work with the various contractor and NASA for security policies and issue instructions, memoranda, and bulletins to protect information.
 - Information security compliance and "Best Practices" designed to ensure that all NASA information systems used to process information are in compliance with NASA policy and federal guidelines.
 - Conduct periodic assessments and maintain logs of system security to assure consistency and compliance with the guidelines.
 - Oversee periodic independent assessment of the security control tests and evaluations results to assure consistency and compliance.
 - For computer security incidents involving IT systems to ensure that the root causes of IT security weaknesses are being addressed.

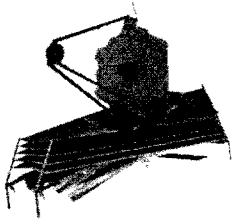


GS&O I&T

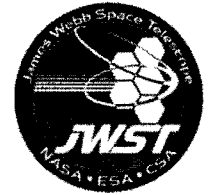
Network and Computer User Information



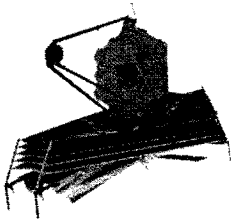
- **Users must have JWST JLAB accounts**
- **User will sign a 'rules' of the network form.**
 - **No inappropriate sites**
 - **All activity is monitored**
 - **No music and video file sharing**
 - **No online gaming**
- **Computers system access limited by MAC address, so if given before arrival, connectivity will happen quicker**
- **All computers prior to use will be scanned by JWST personnel. We will patch only NASA computers. The other computers scan reports will be maintained and those systems will be put on a segregated network.**
- **Access to e-mail allowed on all network, except JLAB.**
- **Access to corporate sites allowed on all network, except JLAB.**
- **Hard-line and Wireless (g/n) available**
- **Cell phone signals are spotty at GSFC and JSC.**



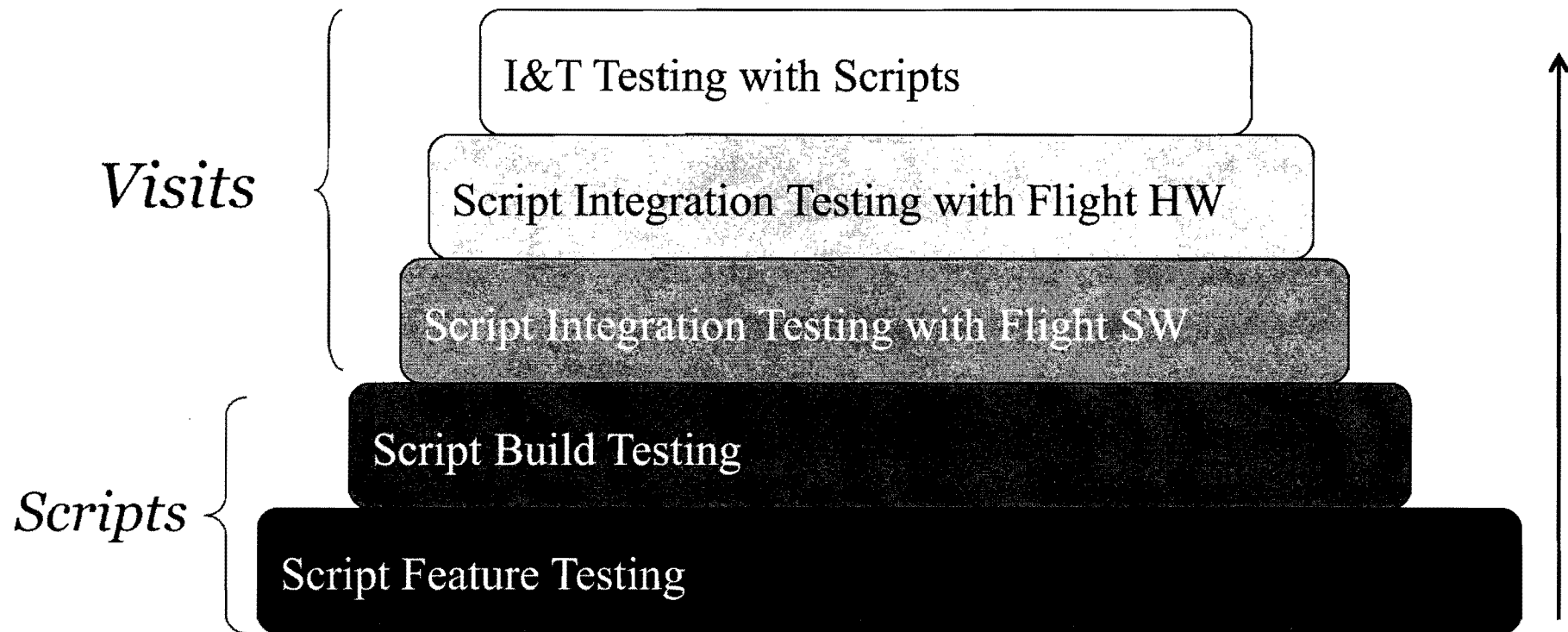
Product Certification



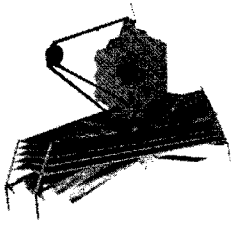
- **All Data Products GS&O PRD will follow PRD certification process**
- **Certification is consistent with the JWST test-as-you-would-fly philosophy.**
- **GS&O products include OSS scripts, dictionaries, CECIL procedures, display pages, etc**
- **All products will be tested at the:**
 - **Unit and syntax level in a local environment**
 - **Tested with simulators in the cert lab**
 - **Tested with ETU hardware, where possible**
 - **Tested with Flight hardware**



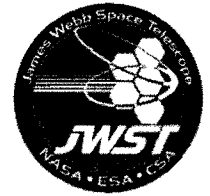
Summary of OSS Test Ideology



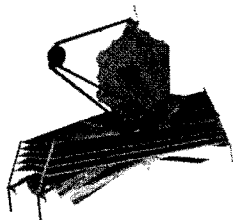
Each test phase relies on the previous phases



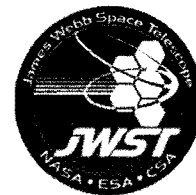
Testing of OSS



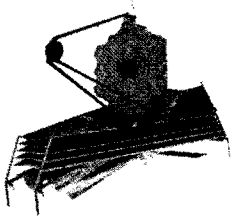
- **For example, scripts testing is performed in a sequence of increasing fidelity environments**
 - **Script Feature testing**
 - verify syntax, logic, internal script interfaces, cmd formats and to verify the OSS level 5 requirements related to feature and assigned liens
 - **Script Build testing** (*all completed subsystem features*)
 - verify compliance with OSS level 5 requirements and to provide a set of functional scripts to the JWST community
 - **Script Integration testing with Flight Software**
 - verify compliance with OSS level 4 requirements and to verify the scripts can use the JWST flight software systems to orchestrate event-driven operations
 - **Script Integration testing with Flight Hardware**
 - verify the entire JWST event-driven commanding system meets its original objectives and is ready for in-flight operations



Locations for OSS Testing



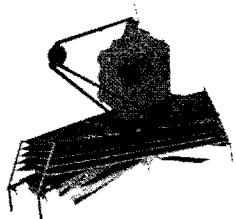
- **Testing occurs in a variety of environments:**
 - Script Feature testing
 - STScI Script Development lab and OSS Developer desktop
 - Script Build testing
 - STScI Script Development lab and ISIM fsw lab
 - Script Integration testing with Flight Software
 - various ISIM fsw labs, Cert lab and EMTB
 - Script Integration testing with Flight Hardware
 - ISIM I&T / JSC I&T / Obs I&T
- **After hardware certification on a script set is completed, it is available for use for other ISIM, JSC, and Observatory I&T activities**
- **Will look for opportunities to use the OSS visits to satisfy ISIM and Spacecraft testing needs**



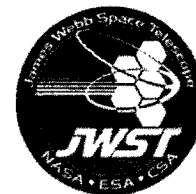
GS&O I&T OSS Key Points



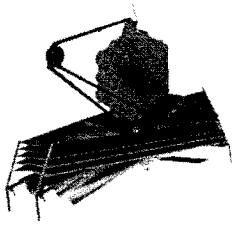
- OSS scripts are certified through four test phases, each advancing closer to in-flight event-driven execution
- Visits used for OSS certification can be also used to satisfy ISIM/JSC/Observatory testing needs and can provide flight-like and efficient I&T test sessions
- Visits that produce science data can easily be repeated if unique identifiers are used



GS&O I&T Training₁



- IGSS is the foundation for all system level I&T activities.
- Experience is the same from a user display and CECIL procedure, so if supporting testing at the SITS and IITS phase you will have the same experience at JSC and NGAS.
- IGSS will provide basic IGSS training, as well as facility network and voice capabilities at GSFC, JSC, and NGAS.
- All users supporting the testing on site will need to have JWST JLAB user accounts as well as provide the MAC address for any computer system that will be on the network.



GS&O I&T Training₂



- All training material will be online at the JLAB.
- IGSS users guides will be online at the JLAB, similar to the SITS. Access to NGIN and E-room allowed for accessing all documentation.
- Central page at www.jwst.nasa.gov/content/home.do is a portal to JLABs web pages and various DR systems.

Warning: This system is for the use of authorized users only. By accessing and using the computer system you are consenting to the system monitoring, including monitoring of keystrokes. Unauthorized use of, or access to, this computer system may subject you to disciplinary action and criminal prosecution.

JAMES WEBB SPACE TELESCOPE

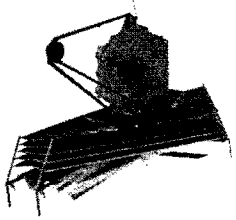
INTEGRATED GROUND SUPPORT SYSTEM (IGSS)

JLAB location	SIDU/SITS/ITSS FAQs	JLAB valid users
IITS DR system	IGSS DR system	GSFC DR system (GPRS)
	JLAB External Telemetry Web Pages	
JLAB88 (IITS Lab at GSFC)	JLAB10 (IGSS Dev Lab at GSFC)	
	JLAB Internal Telemetry Web Pages	
JLAB88 (IITS Lab at GSFC)	JLAB10 (IGSS Dev Lab at GSFC)	

Last Updated 11/20/2008

GS&O I&T May 2009

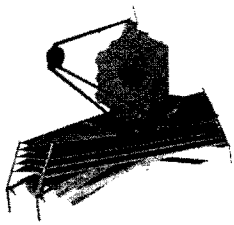
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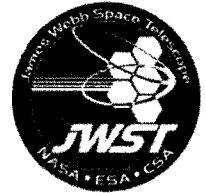
GS&O I&T Summary



- **Testing of GS&O PRD products started in Cert Lab**
- **Detailed OSS Visit definitions and test planning started**
- **Institutional Systems**
 - NISN data lines defined and scheduled
 - FDF product defined and detailed definitions started
 - DSN support agreements in place and detailed testing and interfaces being defined
 - ESA support agreements in place and detailed testing and interfaces being defined



GS&O I&T Summary



➤ ISIM Network and Testing

- Completed ISIM I&T network infrastructure
- Security audits, voice, web servers, and file servers still to be installed and configured
- Started detailed test definitions with ISIM I&T Operations

➤ JSC Network and Testing

- NISN data lines installed and tested with JWST wireless and file server
- Started detailed test definitions with ITT and NGAS

➤ NGAS Network and Testing

- Completed JLAB installation and network
- Started detailed test definitions with ITT and NGAS

➤ SOC Network and Testing

- Subsystem requirements definitions and tracing completed
- Started subsystem test definitions