



ISD Staff Tech Brief



AURA MISSION READINESS TESTING

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Agenda



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Aura Mission Operations Overview



- **Spacecraft built by Northrop Grumman Space Technology (NGST) in Redondo Beach, CA**
- **Successfully launched on July 15, 2004**
- **6-year nominal mission life**
- **Earth Observing System (EOS) Aura is a NASA mission to study the Earth's ozone, air quality and climate**
- **EOS Aura is the third in a series of major Earth observing satellites to study the environment and climate change**



Aura Mission Operations Overview (Cont.)





Aura Mission Operations Overview (Cont.)



- **Designed to conduct research on the composition, chemistry and dynamics of the Earth's upper and lower atmosphere employing multiple instruments on a single satellite**
- **Science objectives achieved via a complement of 4 instruments**
 - **HIRDLS – High Resolution Dynamics Limb Sounder**
 - **MLS – Microwave Limb Sounder**
 - **OMI – Ozone Monitoring Instrument**
 - **TES – Tropospheric Emission Spectrometer**



Mission Readiness Test Overview



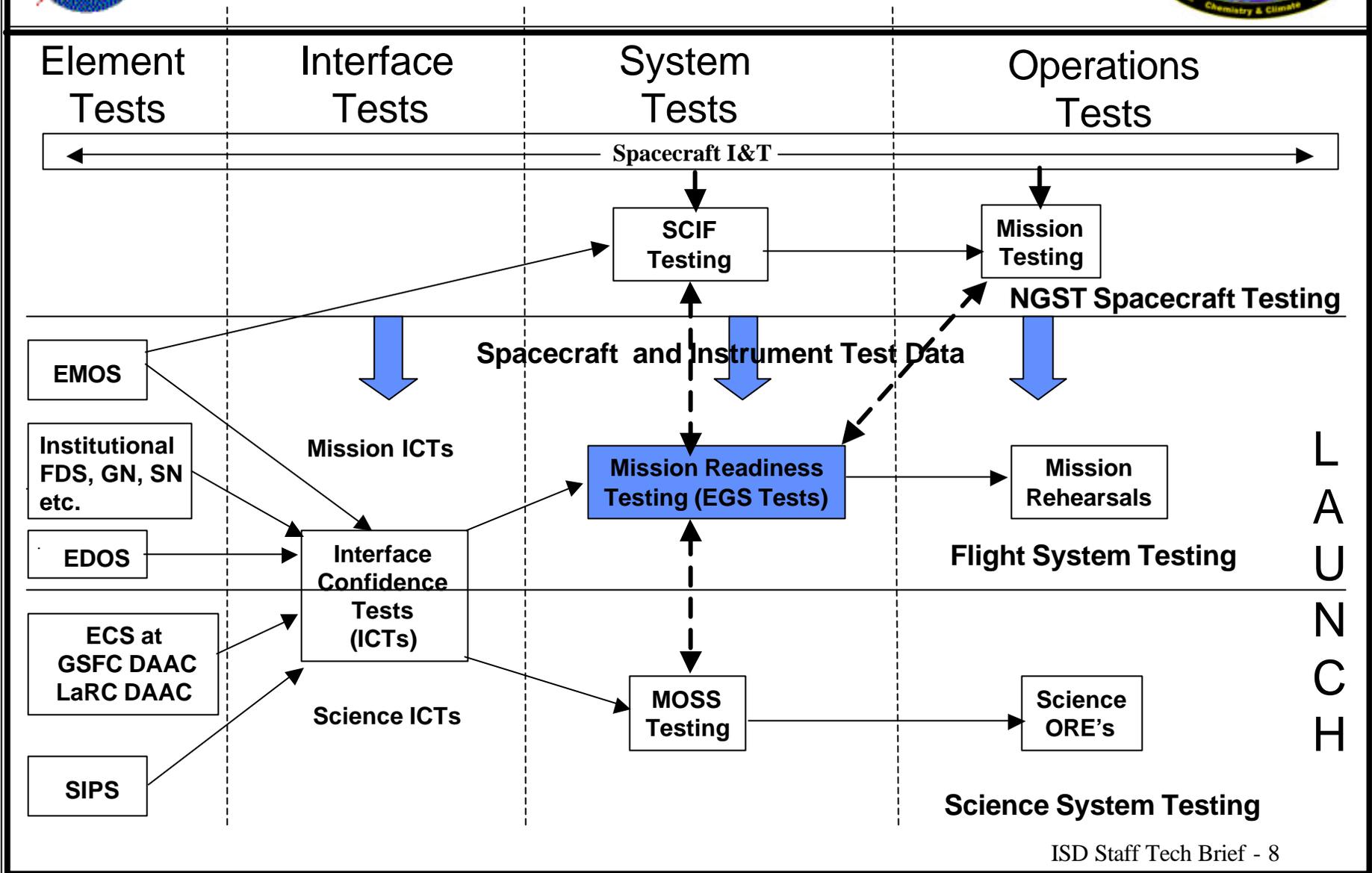
Aura Categories of Testing



- **PROJECT-SPECIFIC**: Led by Mission Manager and Flight Operations Team(FOT)
 - SpaceCraft Interface Tests (SCIFs): direct interface with spacecraft
 - Mission Tests (MTs): simulate nominal on-orbit operations
 - Rehearsals: multiple “day-in-the-life” scenarios
- **MISSION READINESS TESTS**: Led by Mission Readiness Manager
 - EOS Ground System (EGS) Tests: exercise Aura ground system elements from a mission operations perspective
- **SCIENCE DATA FLOWS**: Led by the Science Systems Office
 - Interface Confidence Tests (ICTs)
 - Mission Operations and Science Systems (MOSS) Tests



Aura Testing Road Map





Test Description



- **Mission Readiness Tests are system level tests designed to verify compatibility, capability and performance of the EOS Ground System end-to-end configurations required to support the Aura mission.**



Test Objectives



- **Verify EGS functionality prior to use in SCIF and Mission tests**
- **Verify EGS integrated capability by executing tests as described in the Mission Readiness Test Plan (MRTP)**
- **Maintain independent, documented record of EGS performance, test discrepancies, and resolutions**
(<http://www.gblt.averstar.com/flight/>)
- **Combine End-to-End X-Band tests with MOSS tests to take advantage of test resources and test data**
- **Systematically test and verify the EGS end-to-end configurations to ensure mission readiness for pre-launch, launch, and on-orbit operations**



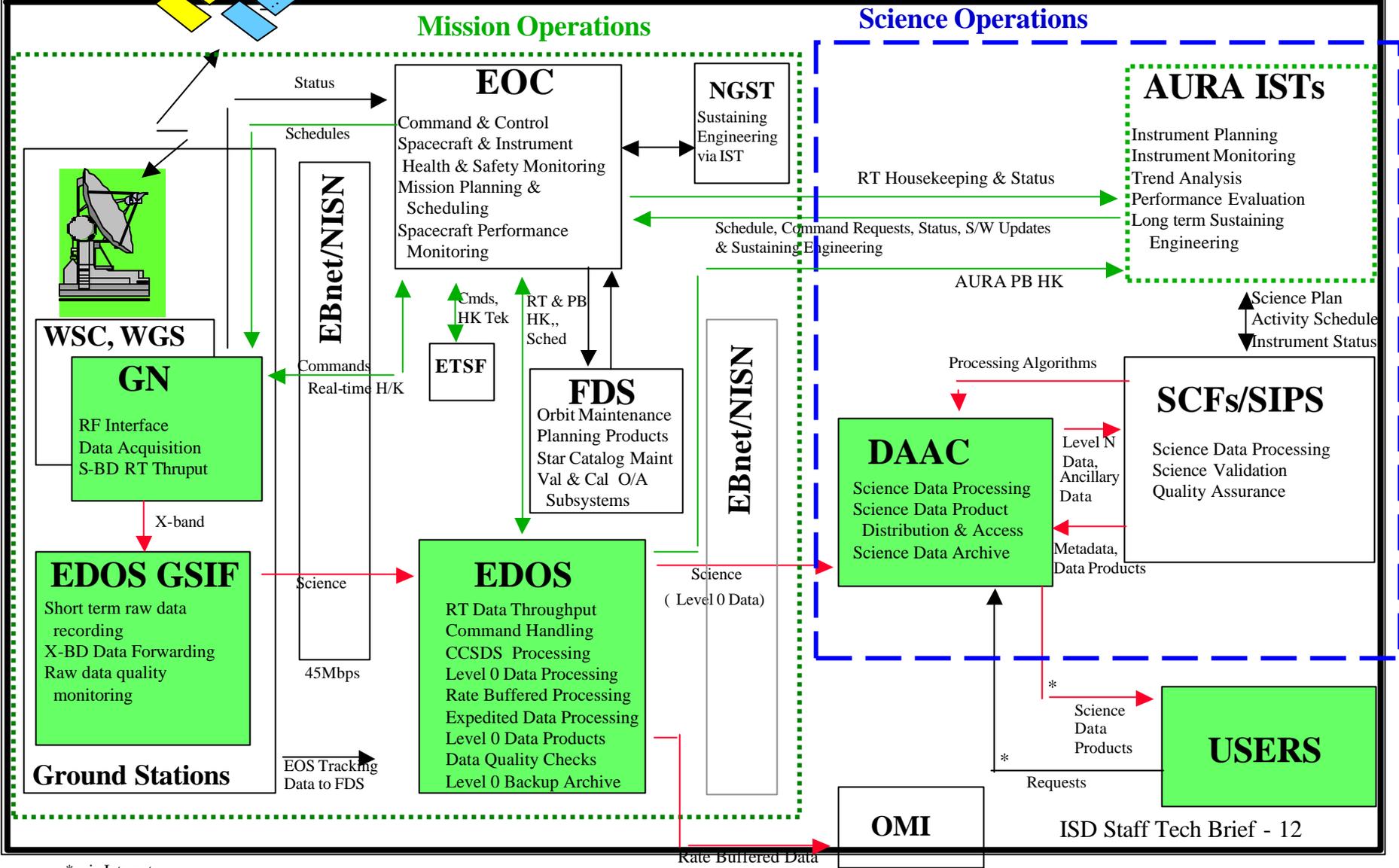
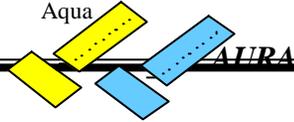
Roles and Responsibilities Mission Readiness Manager



- **Manages the activities of the Mission Readiness Test Team (MRTT) composed of Aura EGS Organizations/Elements and Project Representatives**
- **Serves as focal point for coordinating all MRT activities among EGS Elements, External Centers and Agencies**
- **Provides periodic status of the ground system to Aura Project**
- **Chairs MRTT Meetings:**
 - **Bi-weekly Meetings Starting February 2003**
 - **Weekly Meetings (As Required)**



Aura Ground System Architecture, Functions & Data Flow



* via Internet



Roles and Responsibilities Mission Readiness Test Team



- **Publish the Mission Readiness Test Plan**
 - Defines the mission readiness tests
 - Provides mappings of requirements to specific tests
 - Final delivered August 2002
- **Identify, develop, and maintain the Mission Readiness Test Requirements (MRTRs)**
- **Identify launch critical MRTRs**
- **Develop, coordinate, and maintain the Mission Readiness Test Schedule**
- **Develop and execute ground system tests to meet mission and operational requirements**



Roles and Responsibilities Mission Readiness Test Team (cont.)



- **Lead all MRT tests and related activities:**
 - coordinate expected test data receipt
 - inform affected test participants of potential deviations due to anomalies
 - Identify operational constraints
- **Provide an independent assessment of test results as input to MRM for: Statusing, Flight Operations Review, etc.**
 - identify areas of risk
 - provide an assessment of end-to-end system performance



Testing Approach for Aura



- Use the experience gained from testing Terra, Aqua and ICESat ground systems
- Test after Element Acceptance Test (AT)/ Verification Test (VT) verifies readiness for MRT participation
- Verify functionality prior to use in system and operations tests (SCIFs, MTs, etc.)
- Emphasize performance, load, and ETE testing in a multi-mission environment (subject to resources and constraints)
- Use the core set of Aqua tests customized for Aura
 - The Mission Readiness Test Team executed system-level tests (EGSs) which culminated with a “full-up” multi-mission “stress” test



Testing Approach for Aura (cont.)



✍ Focus on differences between the Aqua and Aura mission

- **EDOS: New Instrument products, Interfaces**
- **DSMC: SN operations, GN and SN resource scheduling**
- **EMOS: Online – New OS, command header, checksum**
 - MMS – New FDS products, 8 day/8 week time span**
 - Analysis – OMIS X-Band Engineering data, TES dump data to MMS**
 - ISTs – New remote ISTs**
- **ERPS: Resource loading, new 911 GSIP**
- **FDS: Receipt of GN and SN tracking data, new products**
- **GN: EOS Mission Loading, new antenna (SG3, GLC)**



Measuring Success

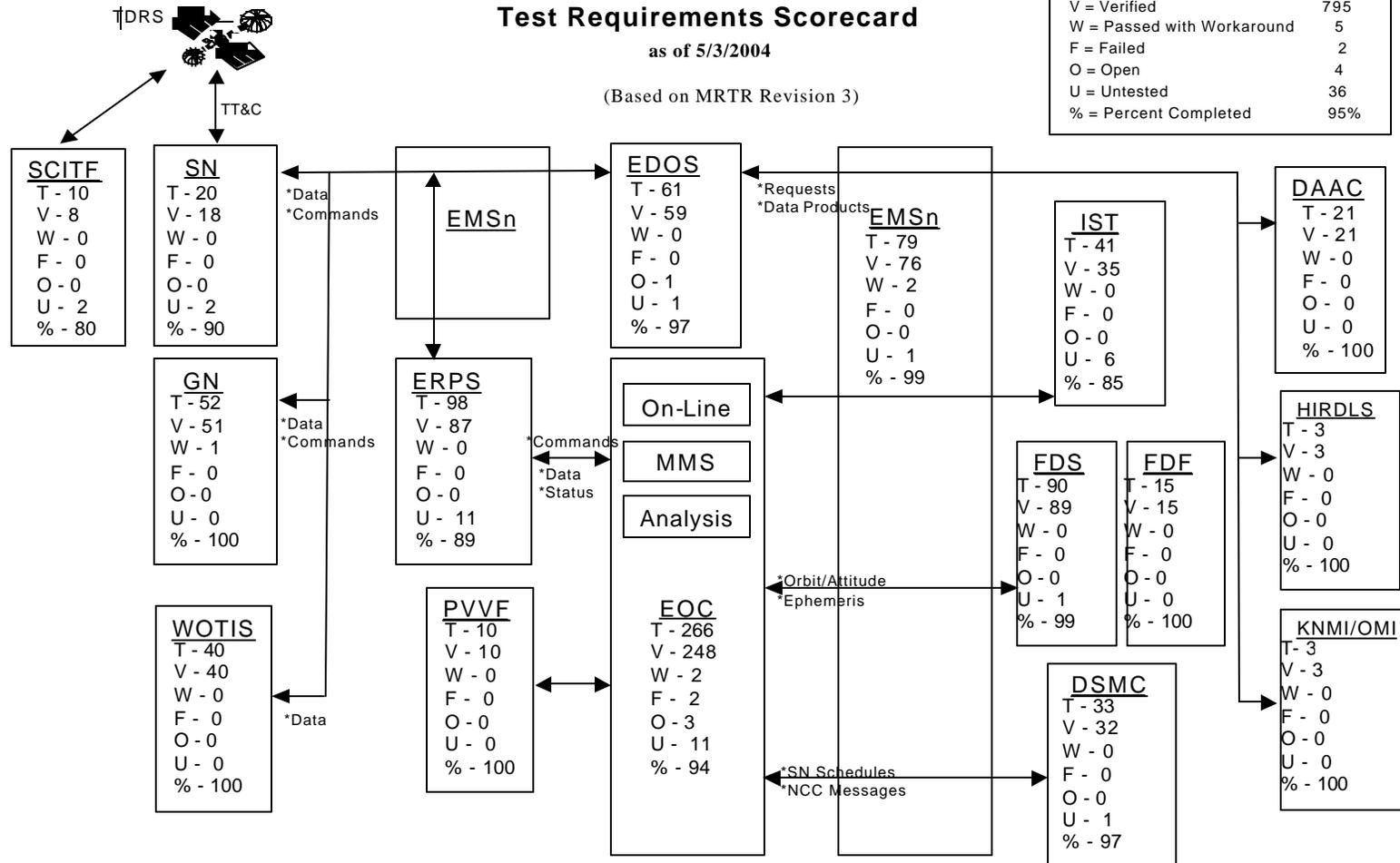


Aura Mission Test Requirements Scorecard

as of 5/3/2004

(Based on MRTR Revision 3)

Legend:	Summary:
T = Total Requirements	842
V = Verified	795
W = Passed with Workaround	5
F = Failed	2
O = Open	4
U = Untested	36
% = Percent Completed	95%



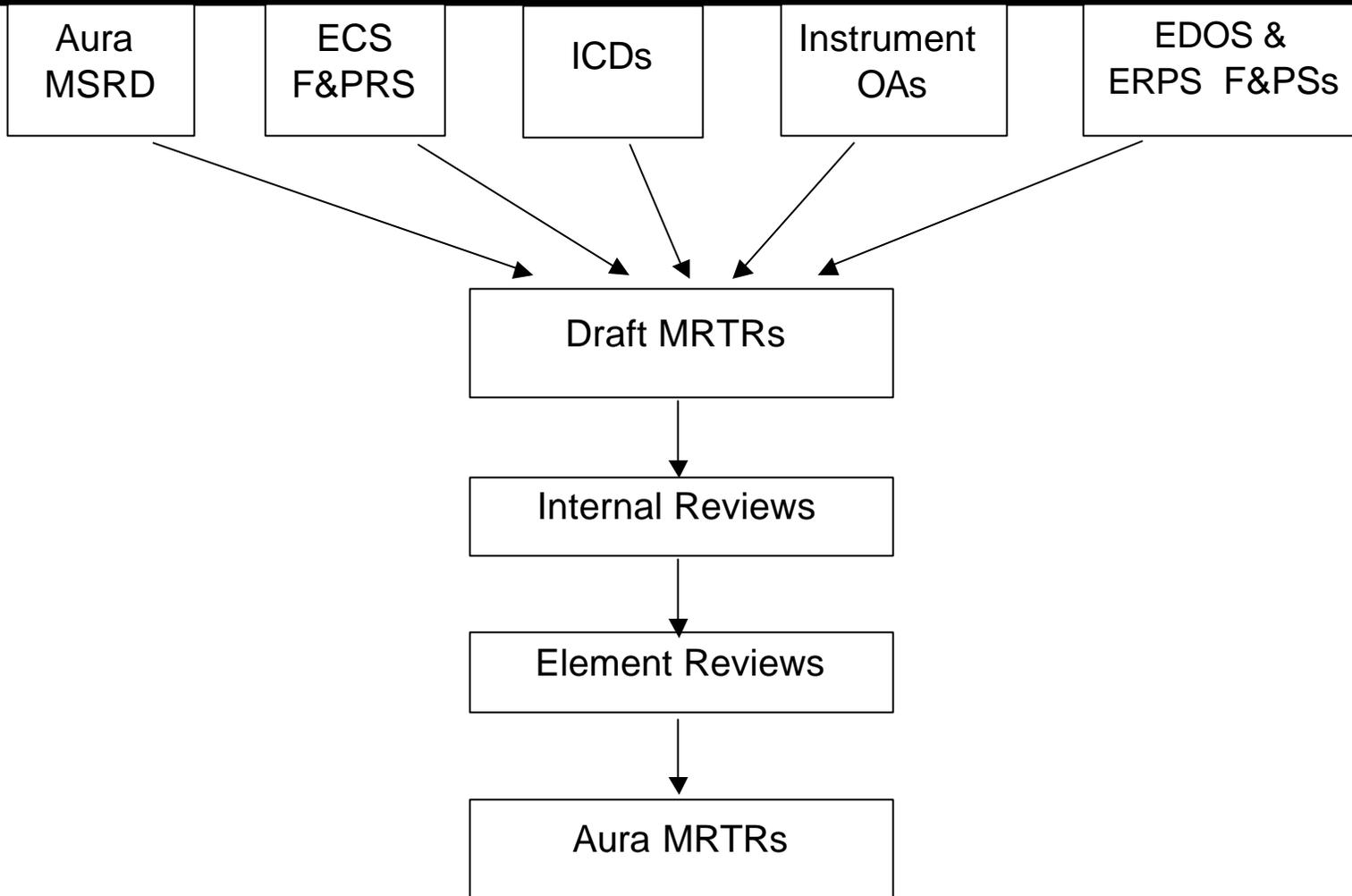


Backup Slides



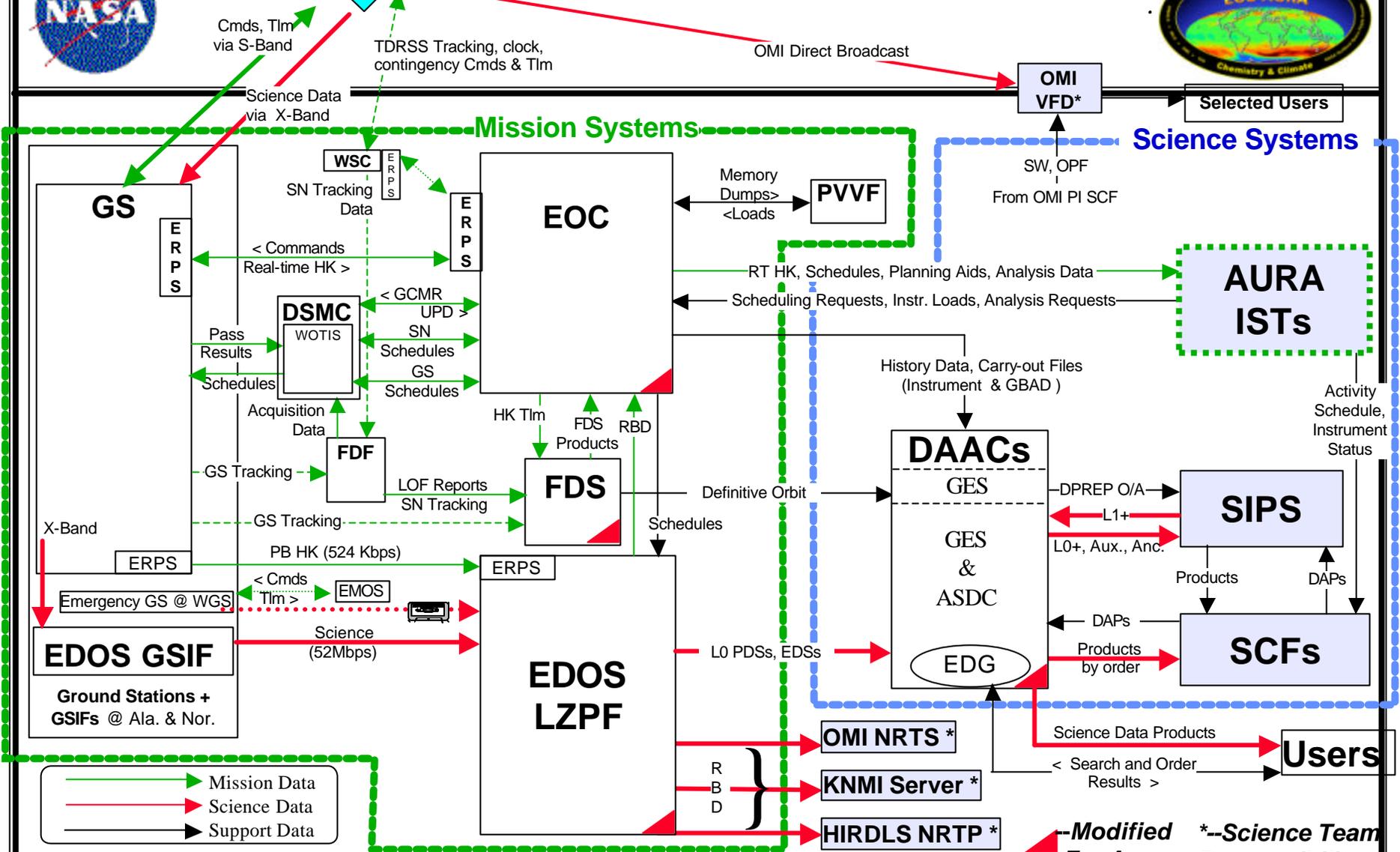


MRTR Development





Aura Context Diagram



- Mission Data
- Science Data
- Support Data

EMSn / ESSn / NISN networks not shown

 - Aura Specific

→ Modified For Aura * - Science Team Responsibility