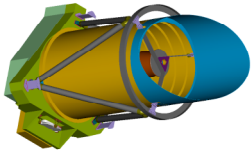


HiRISE Operations Center Overview

Eric Eliason

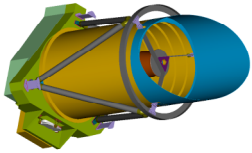
Co-Investigator and Ground System Manager

October 13, 2004



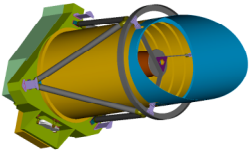
High-Level Requirements relevant to HiCat (1/4)

Data Observations and Volumes
Target and acquire 10,000 observations during PSP (~14 observations/day, 1-2 observations/orbit)
<ul style="list-style-type: none">– 4,000 Coordinated Observations (single views)
<ul style="list-style-type: none">– 1,000 Coordinated Targets for stereo (2,000 Images)
<ul style="list-style-type: none">– 4,000 Noninteractive nadir observations
Acquire, downlink, and process 9.1 Tb of instrument science data during PSP
Observation Planning and Uplink
Gather Image Suggestions from Science Team, Mars Investigators, and EPO activities
<ul style="list-style-type: none">– Image suggestions could number in the 100,000s
<ul style="list-style-type: none">– Suggested images identified weeks, months, or years before observation is acquired
<ul style="list-style-type: none">– Populate and maintain a database of image suggestions
Uplink Sequence Generation (HiPlan)
<ul style="list-style-type: none">– Participate in Target Acquisition Group meetings to identify coordinated observations on 14 day cycle
<ul style="list-style-type: none">– Develop Noninteractive Nadir Observations – planned weekly
Track uplink operational events including:
<ul style="list-style-type: none">– Image observations and the commanding associated with the observations
<ul style="list-style-type: none">– Image Sequences & uplink steps leading to transmission of instrument commands sent to the spacecraft



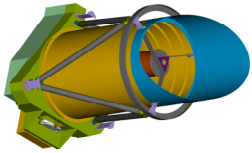
High-Level Requirements relevant to HiCat (2/4)

Downlink Data Processing
Receive and catalog downlink data obtained from MRO GDS at JPL
Automate data processing for standard data product creation
Verify and Validate standard data products
Track downlink processing and operational events
<ul style="list-style-type: none">– <i>Check downlinked data against uplink commanding</i>
<ul style="list-style-type: none">– <i>Track progress of downlink processing</i>
<ul style="list-style-type: none">– <i>Report processing anomalies and downlink statistics</i>
Track image quality for feedback to uplink targeting specialists
Data Access to Science Team, MRO Project, and Public
HiRISE products available to Science Team and MRO investigators within weeks of observation
HiRISE products available to general public on best effort basis
HiRISE products available through web-based access and high-volume media distribution
<ul style="list-style-type: none">– Products searches based on time, geographic position, viewing conditions, instrument operating modes, and observation success
Archive Preparation and Distribution to Planetary Data System
Hardmedia deliveries provided to PDS on a schedule defined in the MRO Data Archive and Transfer Plan.
Deliveries to the archiving institution must meet PDS standards (PDS labels, ancillary data, documentation)



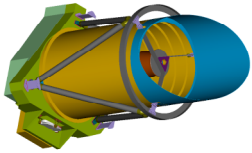
High-Level Requirements relevant to HiCat (3/4)

Data Product Preparation
EDR Products (Experimental Data Record) – Raw spacecraft images
– 200,000 EDR products (assume 10,000 * 20 Channels/observation)
RDR Products (Reduced Data Record) – Radiometrically calibrated and geometrically processed
– 30,000 RDR Products (assume 10,000 * 3 RDR products/observation)
Supporting Data Products
Maintain a searchable data base for related image products including CTX, CRISM, MOC, THEMIS, Viking, and other imaging as appropriated.
HiRISE GDS Hardware
HiCat maintained on a system that can keep up with the HiROC demands
3X processing capability
On-line storage capability of 3X capacity of HiRISE data product inventory
Uplink backup facility maintained at JPL
Provide system and network security to prevent external intrusions into HiROC
Maintain reliable backups of complete HiRISE datasets and catalog system

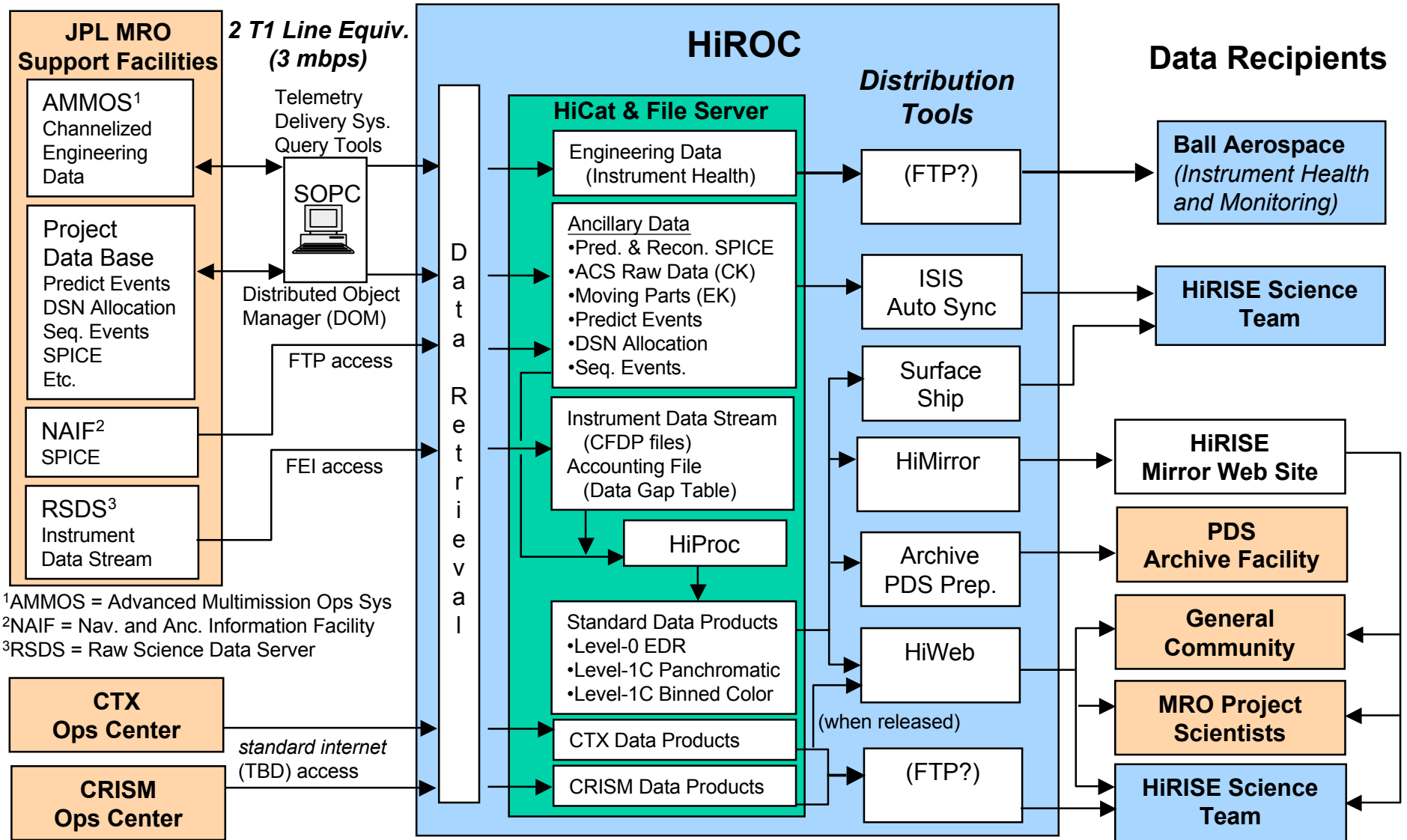


High-Level Requirements relevant to HiCat (4/4)

Monitor Instrument Performance and Health
Conduct routine instrument health monitoring through all mission phases
Engineering database at HiROC immediately available to Ball engineers
Weekly anomaly reports prepared for Science Team
Six Month Performance Reports prepared for Science Team
Science Data Analysis
Science analysis and image processing carried out at Co-I institutions
Co-Is equipped with work stations to support data analysis
HiRISE image processing capabilities for
<i>Data Ingestion</i>
<i>Radiometric Calibration</i>
<i>Geometric Processing</i>
<i>Photometric Normalization</i>
<i>Color Merge</i>
<i>Image Analysis and Display</i>
<i>Cartography (mosaicking, map projection, c-smithing, tie-point control)</i>



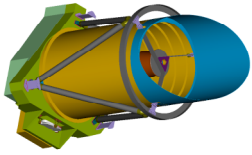
Downlink Data Flow Interfaces



¹AMMOS = Advanced Multimission Ops Sys

²NAIF = Nav. and Anc. Information Facility

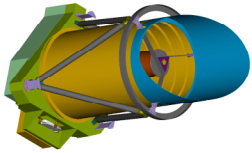
³RSDS = Raw Science Data Server



GDS User Scenarios

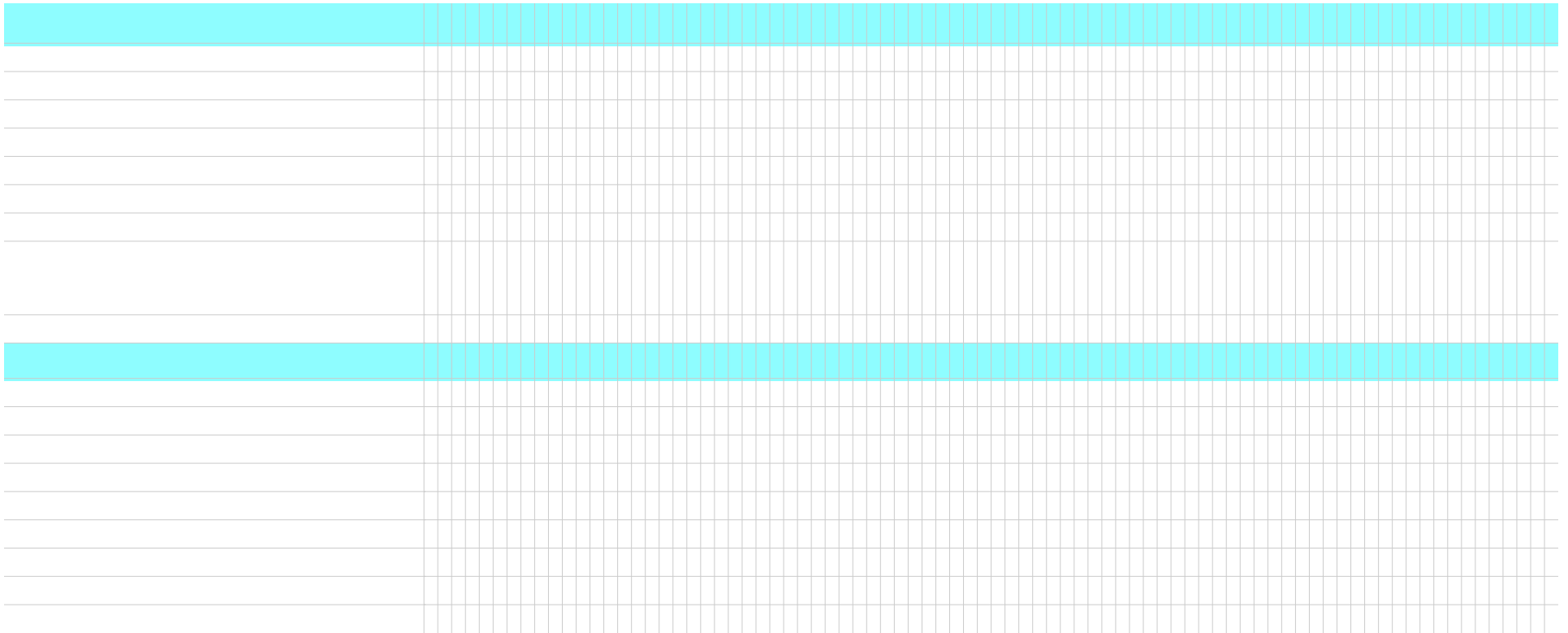
Anticipate questions/queries posed to HiCat by operations staff and ground data subsystems.

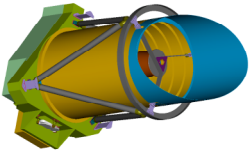
- Determine if database contents and organization could satisfy the question posed.
- Develop SQL command.
- Examples:
 - For a particular time period what percent of the returned image data has been lost (gaps in data stream).
 - Provide a report of image statistics (mean, standard deviation, image saturation) and data quality for images returned in the last 24 hours.
 - For observations commanded in the last 24 hours, what images have been received and what is the status of the downlink processing on each image.



HiROC Implementation Schedule

HiROC Ground Data System is developed incrementally to meet processing needs for project milestones ATLO, ORT, Launch, MOI, Transition orbit.





HiCat Capabilities by GDS Release

GDS Release 0.2 (Calibration/ATLO/SVT)

Support functionality of HiWeb testing (image suggestion), HiCommand, HOGG, HiDOG, downlink pipeline processing through EDR production.

GDS Release 0.3 (ORT) & 1.0 (Launch)

Added support for operational HiWeb (image suggestions), Engineering Health and Safety Monitoring, and HiReport. Institute security measures on data base access.

GDS Release 2.0 (MOI)

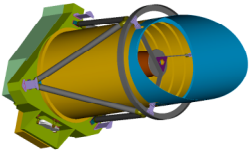
Added support for HiPlan, RDR product generation, HiWeb image distribution, data validation, Ancillary Data management (HiSPICE),

GDS Release 2.1 (Transition Orbit)

Refinements to existing capabilities, system tuning, handling high volume database access for image suggestions, science team science planning, and data distribution queries.

GDS Release 2.2, 2.3, 2.4 (Data product Deliveries to PDS)

Support to archive preparation and delivery to PDS. Generating index tables and other ancillary data.



Issues and Concerns

- Ross leaves HiRISE project for Research position, need to find a permanent DBMS specialist.
- HiCat DBMS specialist
 - Applications programming and database technology.
 - MySQL database server operation and management.
 - Java programming skills
 - Familiarity with Unix systems
- Security - HiCat to support external users, vulnerable to attack
- External users affect HiCat performance, essential operations impacted.