ECS SDPS
Incremental Release Review for 6A

31 January 2000

Raytheon

IRR Overview

Mark McBride

Raytheon

Welcome

- Facilities
- Available Documentation
- Questions
- In-Progress Review

IRR Objectives

- System Requirements meet Project Objectives
- Requirements Verification Traceability (Test Planning)
- Preliminary Design Information
- Key 6A Activities

- Results In:

  Customer approval to proceed

Agenda

• Overview	Mark McBride	9:00 AM
• Requirements	Richard Meyer	9:10 AM
• Design		
– Development Overview	Mary Armstrong	9:50 AM
– Machine-to-Machine Gateway	Karl Bugenhagen	10:05 AM
– FTP Pull Subscriptions	Karl Bugenhagen	10:20 PM
• Break		10:30 AM
• Design (Continue)		
– Reprocessing	Alex Hu	10:45 AM
– Attached DPR	Cristina Bories	10:55 AM
– VO Gateway Enhancements	Guy Swope	11:10 AM
– Archive Improvements	Donald Brown	11:25 AM
• Lunch		12:00 PM

Agenda (Cont.)

• Design (Continue)		
– Multi-Host Scheduling	Donald Brown	1:00 PM
– Granule Deletion Administration	Adrienne Dupree	1:40 PM
– SDSRV Performance Enhancements	John Cockey	1:50 PM
– PDPS Performance Improvements	Desryn Duncan	2:05 PM
• Break		2:20 PM
• COTS Software/Hardware	Ravi Nirgudkar	2:30 PM
• Test Engineering	Bob Kniffin	2:40 PM
• Performance Verification	Skip Linehan	3:00 PM
• Release Transition	Bill Johnson	3:10 PM
• Wrap-up/Summary	Mark McBride	3:30 PM

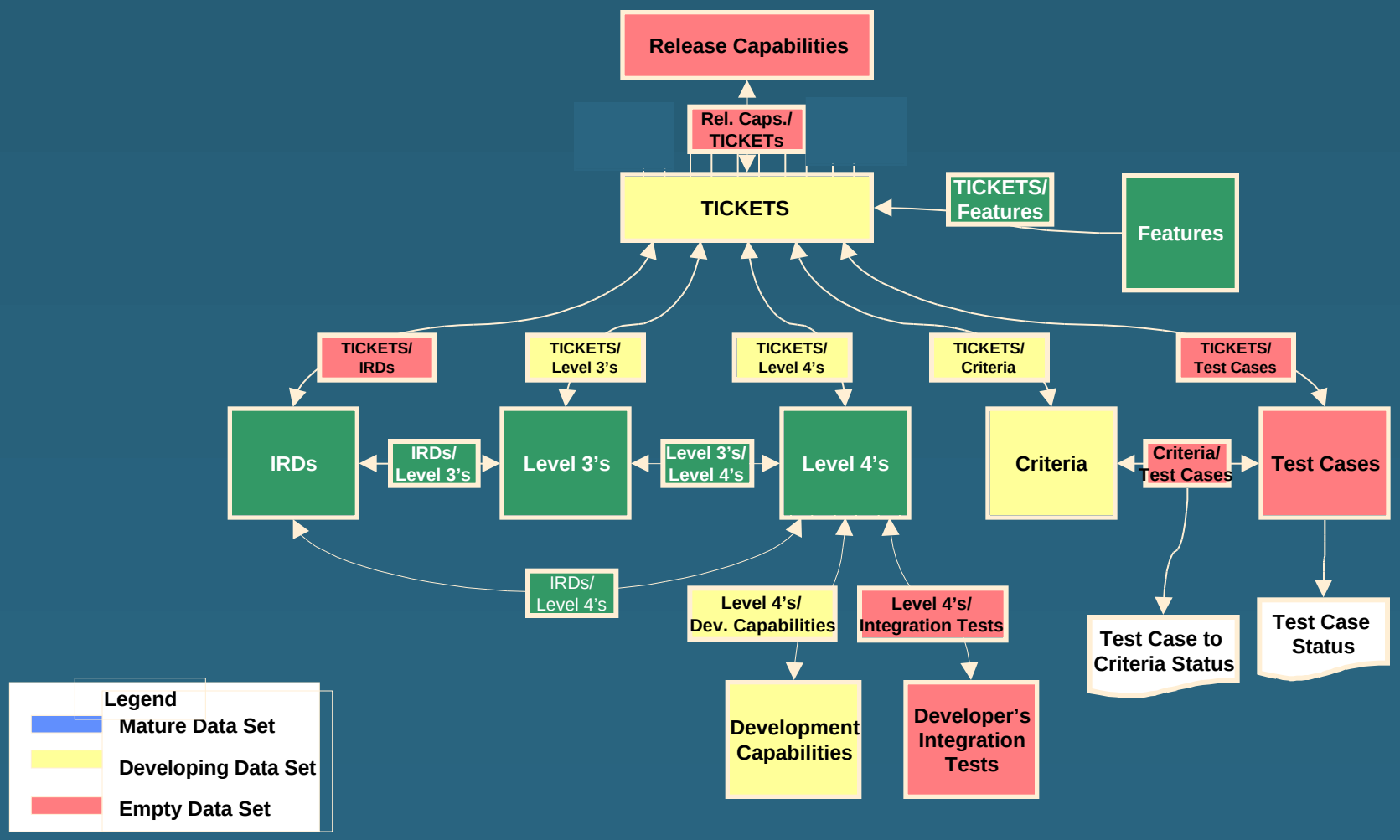
Key 6A Milestones

- Incremental Release Review (IRR)
- Test Ready Review (TRR)
- Consent to Ship Review (CSR)
- Site Readiness Assessment (SRA)

Requirements and Design Process

- Release Capability (RC) derived from L4 requirements containing L3 requirements
- Tickets created for requirements and Acceptance Criteria
  - Set of acceptance criteria for Functional Components, Error
  - Mapping to release capabilities
  - Mapping to L4s
- Tickets map to a single release capability to a single test (where possible)
- Standard ESDIS approval cycle
- Parallel reviews with the Test Organization, Development Organization, and ESDIS

6A-era Verification Database Schema



Key 6A Activities

- COTS Software
- Hardware Upgrades
- Performance Verification (PVC)
- Transition Activities

Requirements

Richard Meyer

Raytheon

Briefing Overview

Briefing Objective

Mission Requirements

ESDT Requirements

Ramp-up Capacities

Release Capabilities

6A New Mission Aspects

Reprocessing for Terra (ECS and SIPS)

- **Access & Deliver Reprocessing Inputs**
- **Archive & Retrieval for Reprocessed Data**
- **Support Deletion of Obsolete Data**

Processing and Archiving for Aqua (ECS and SIPS)

ICESat GLAS

ESDT Requirements

Instrument	Number of new ESDTs
ICESAT GLAS	33
LANDSAT 7 MOC	1
EMOS	11
MODIS PM-1	657
Total	**702**

Updates to ESDT descriptor files

- All Science ESDTs are updated to eliminate distribution media options

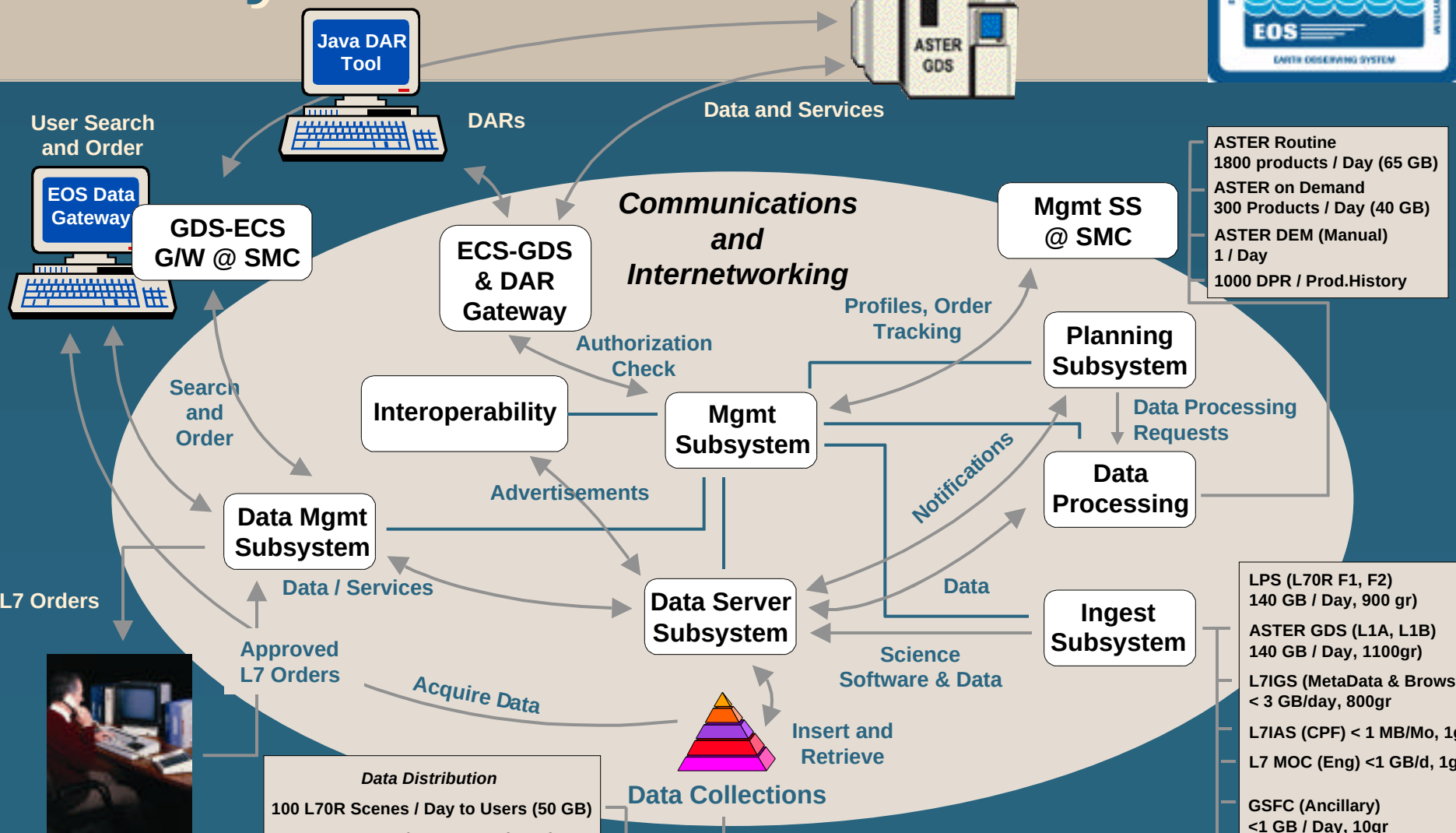
Ramp-up Capacities

	Archive Volumes GB / day	Granules Added # / day	Processing Power MFLOPS
EDC	740	11,400	1,650
GSFC	1,280	9,800	6,400
LaRC	330	3,200	9,700
NSIDC	60	2,600	100

	Archive Volumes Cumulative TB	# of Granules Cumulative '000s	Distribution	
			Network GB / Day	Tape GB / Day
EDC	490	6,100	280	240
GSFC	750	5,300	520	520
LaRC	240	2,200	100	100
NSIDC	25	1,100	20	20

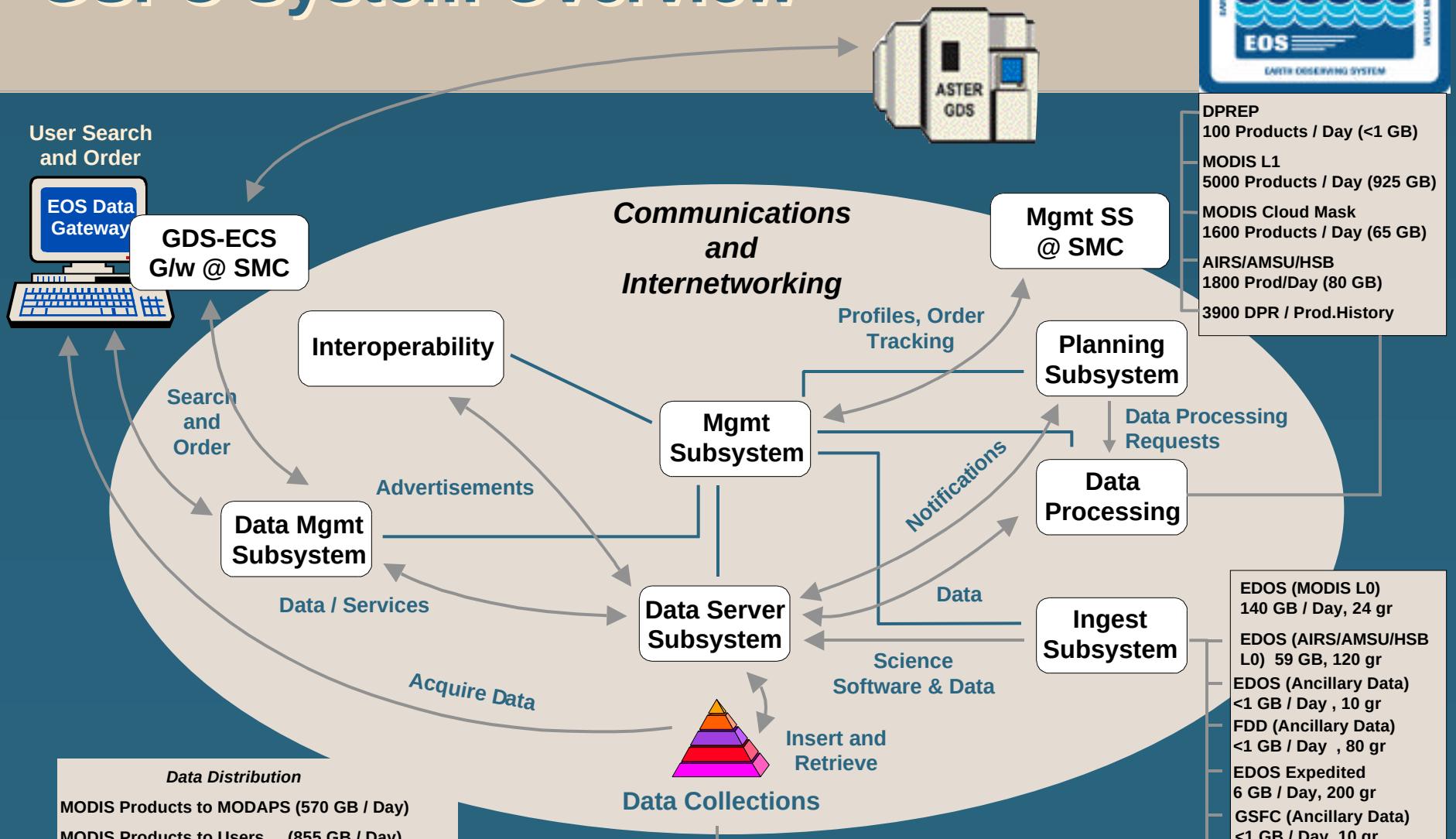
Notes: Baselined Capacities at the End of 2001
Archive quantities assume the specified granule deletion rate
Daily volumes represent growth rates

EDC System Overview



Raytheon

GSFC System Overview



DPREP
100 Products / Day (<1 GB)

MODIS L1
5000 Products / Day (925 GB)

MODIS Cloud Mask
1600 Products / Day (65 GB)

AIRS/AMSU/HSB
1800 Prod/Day (80 GB)

3900 DPR / Prod.History

EDOS (MODIS L0)
140 GB / Day, 24 gr

EDOS (AIRS/AMSU/HSB L0) 59 GB, 120 gr

EDOS (Ancillary Data)
<1 GB / Day , 10 gr

FDD (Ancillary Data)
<1 GB / Day , 80 gr

EDOS Expedited
6 GB / Day, 200 gr

GSFC (Ancillary Data)
<1 GB / Day, 10 gr

DAS (DAO Data)
2 GB / Day, 20 gr

MODAPS (MODIS Data)
150 GB / Day, 9000 gr

Data Distribution

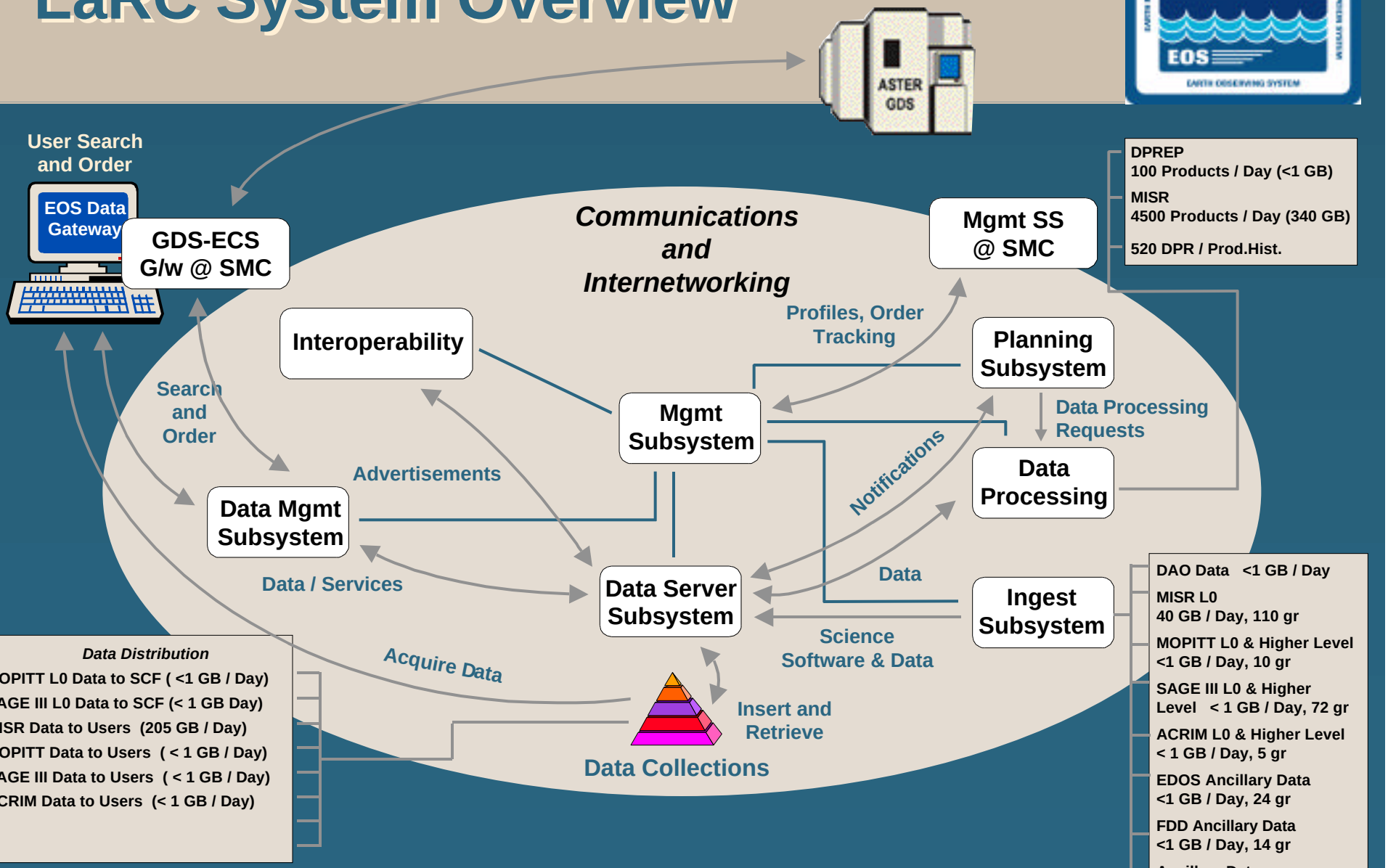
MODIS Products to MODAPS (570 GB / Day)

MODIS Products to Users (855 GB / Day)

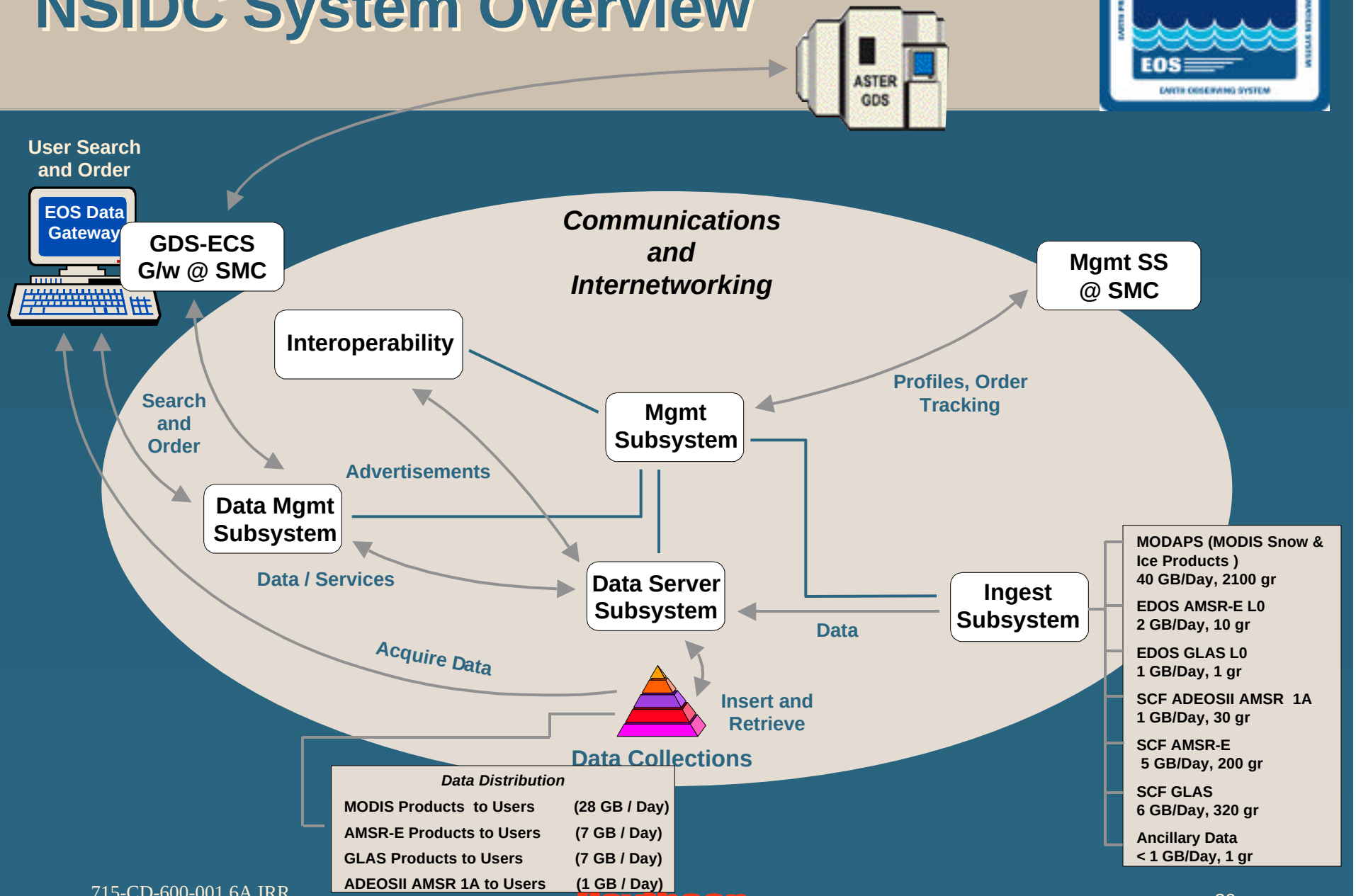
ASTER L0E Products to EDC (<2 GB / Day)

AIRS/AMSU/HSB Products to Users (145 GB/Day)

LaRC System Overview



NSIDC System Overview



Data Distribution	
MODIS Products to Users	(28 GB / Day)
AMSR-E Products to Users	(7 GB / Day)
GLAS Products to Users	(7 GB / Day)
ADEOSII AMSR 1A to Users	(1 GB / Day)

Release Capabilities

Performance

- Hardware Upgrades
- Science Data Server Performance Improvements
- Production Planning and Processing Throughput Enhancements
- Distribution Load Balancing *[RS_6A_04]*
- Archive Throughput (Parallel AMASS I/O) *[RS_6A_05]*
- Enhanced Logging to Help Plan the Future Improvements *[RS_6A_05]*

Release Capabilities

Machine-to-Machine Gateway *[RM_6A_05]*

- Supports Data Orders for Reprocessing by SIPS
- Interface for Data Searches and Orders
  - Uses Native ECS Data Model
  - Supports Automated Order Tracking
- External Client is Assumed to be a Program or Script
  - Command based
  - Corresponding Fault Handling, Recovery Behavior
- Side Effects
  - Order Tracking Enhancements
  - Security

Release Capabilities

Other External Interfaces

- Tape Ingest of IGS Browse Data and Metadata *[EN_6A_01]*
  - Upgrade to 5A Electronic Ingest
- L7 Engineering Data from MOC *[RS_6A_06]*
- EDOS Back-up *[RS_6A_03]*
  - Side Effect: Need D3 Tape As a Distribution Option

Release Capabilities

Science User

- V0 Gateway Enhancements *[EN_6A_02]*
  - Provide Access to Non-spatial and/or Non-temporal Collections
  - User Can Select Attributes to be Returned in Result
    - -Default vs. Full Set or Individual Attributes
- Attaching Processing Requests to DAR *[RM_6A_07]*
  - Integrated with DAR Tool
  - Essentially a “Standing Production Order”
  - Can be More Than One Order per DAR
  - Triggered Each Time L1B for the DAR Arrives
  - Side Effect: Order Tracking Enhancements

Release Capabilities

Science User

- New Distribution Media *[RS_6A_01]*
  - DLT, CD-ROM, D3
  - Side Effects:
    - -Move Distribution Options to Configuration Registry
    - -Must Deal with Low Capacity Media
- Compression for Distribution *[RS_6A_02]*
  - Side Effect:
    - -Can't Determine Order Size in Advance
- FTP Pull Subscriptions *[RM_6A_04]*
  - Operator Can Pick Any of the Distribution Options

Release Capabilities

Operability

- Reprocessing *[RM_6A_01]*
- Operator Interface for Granule Deletion *[EN_6A_04]*
- Logical Archive ID *[RS_6A_05]*
- Storage Management Architecture Changes *[RS_6A_04]*
  - Multi-Host Scheduling
  - Request Manager
  - Improved Fault Handling

Development Overview

Mary Armstrong

Raytheon

Development and Integration Approach

Requirements
Review / Workoff

L4 Requirements
L3 to L4 Traces

Preliminary Design,
Inspection, Workoff

.Sitemap updates
Use Cases
Class Diagrams
Sequence Diagrams
Integration Test Plan
DID 305 Updates
DID 313 Updates
DID 609 Updates

Detailed Design,
Inspection, Workoff

Preliminary Design
Artifacts

and

PDL or State
Transition
Diagrams
Integration Test
Procedures
Unit Test Plans
DID 311 Updates

Code,
CUT Inspection, Workoff

Updates to Design
Artifacts

and

Code
Unit Test Procedures

Unit Test Preparation,
Unit Test Execution

Updates to
Artifacts

and

Unit Test Results

Pre-integration,
Merge,
EDF Integration

Updates to
Artifacts

and

Merge Form
Integration Test
Results

6A Capability Status

	Completed	Total
Requirements Reviews	31	31
Preliminary Design Inspections	7	38
Detailed Design Inspections	0	41
Unit Test Executions	0	41
Merges	0	41
Integration Activities	0	41

6A Estimated SLOC

SLOC TO CAPABILITY TRACING	
Capability	**SLOC**
Machine-to-Machine G/W	2,050
FTP Pull (Subscription Server)	200
Reprocessing	700
DPR Attached to a DAR	2,375
V0-ECS GTWAY Performance Enhancements	652
Archive Improvements	8,825
Multi-Host Scheduling	3,675
Granule Deletion Administration	5000
SDSRV Performance Enhancements	5,000
DPS and PLS Performance Enhancements	6,100
Support for Ordering New Media Types	950
Support for CD-ROM and DLT	4,181
EDOS Backup	552

Development Presentation Agenda

Presentations cover new capabilities that are significant in scope or system impact

Agenda for new functionality presentations is as follows

- **Requirements Summary**
- **Design Changes**
  - -Key Drivers
  - -Hardware / Software Changes
  - -Interaction Diagrams
- **End User Interactions**
- **DAAC Operations Impacts**

Machine-to-Machine Search and Order Gateway

Karl Bugenhagen

Raytheon

Requirements Summary

Allow SIPS to reprocess data externally to ECS via a reliable, high-speed gateway that provides search and order capabilities.

- **Supported by requirements in IDG, SDSRV, MSS, and DMS**
  - **IDG introduces a new server (MTMGW) which provides an search and order capability**
  - **SDSRV accepts inventory searches and product requests from the MTMGW and returns search results to the MTMGW**
  - **MSS stores SIPS order identification data in its order tracking database to prevent redundant orders and allow operators to view SIPS order status**
  - **DMS provides type information for qualifying metadata specified in a SIPS search request**

Key Design Drivers

- Secure connection between SIPS and ECS
- Effective reuse of ECS capabilities (MOJO Gateway and distribution)
- Interface allows for low cost SIPS development using scripts
- Automated recovery and graceful shutdown
- Use of ECS (rather than VO) data model

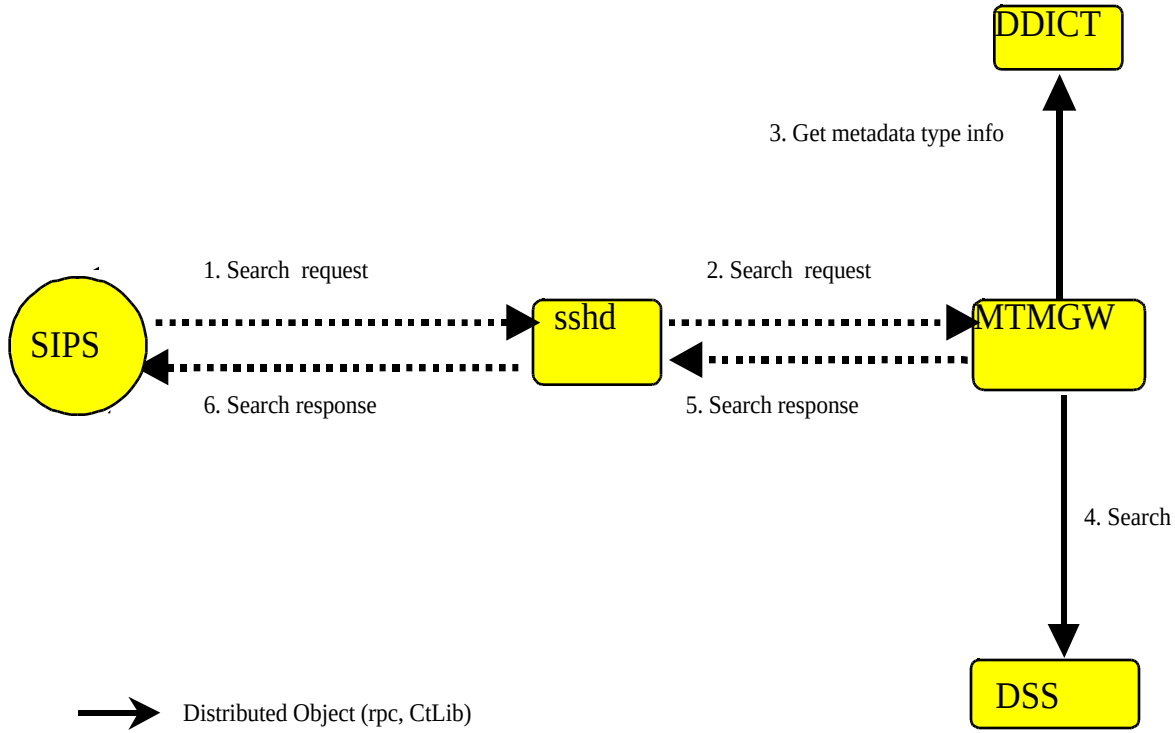
New SW Components

- MTMGW – New CSCI in IDG Subsystem
  - Receives requests from SIPS
  - Creates orders and requests with MSS
  - Submits searches and acquires to SDSRV
  - Returns search and product order results to SIPS
- Secure Shell COTS (ssh)
  - Establishes a secure communication tunnel between SIPS and ECS used to route commands as well as standard I/O
  - Uses standard encryption private/public keys at the SIPS and ECS sites
  - Each SIPS has unique set of keys
  - ssh client at SIPS talks to ssh daemon (sshd) at ECS

New HW Components

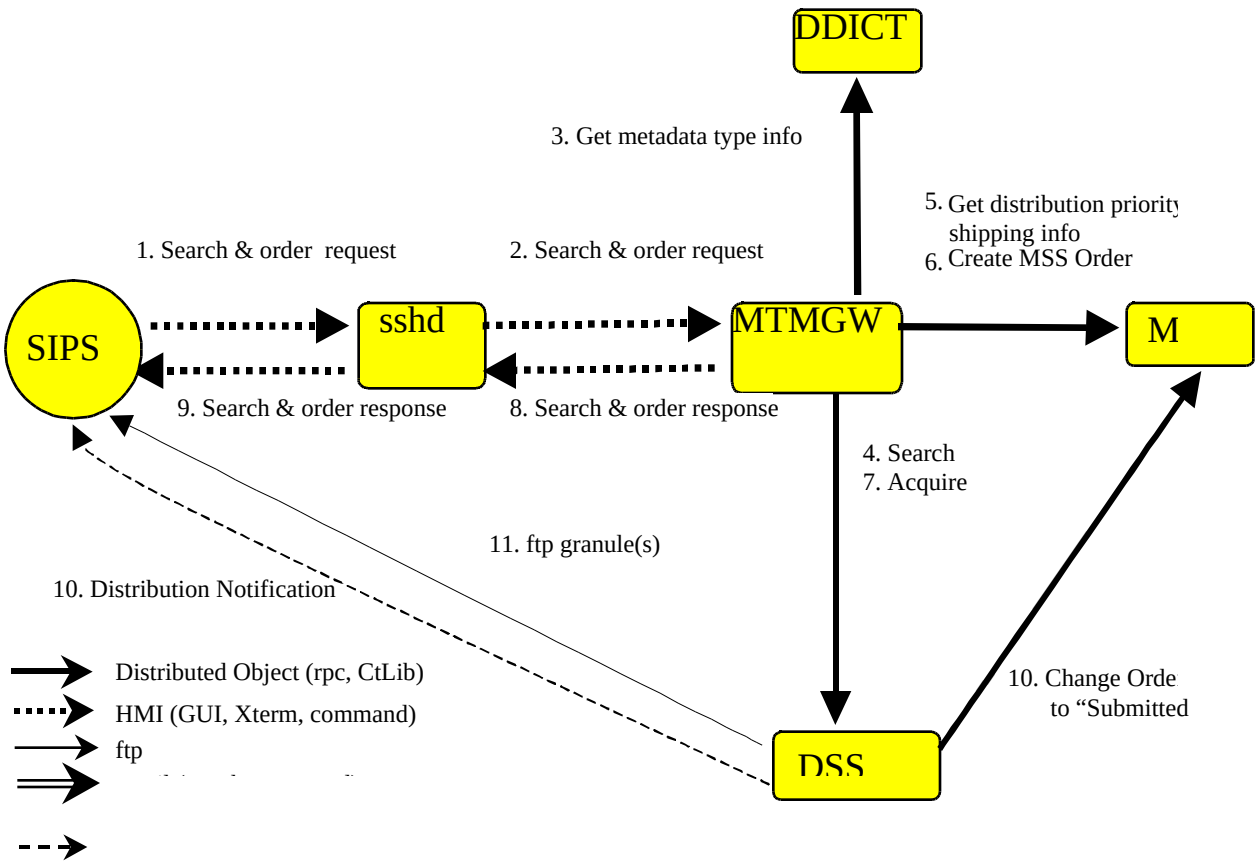
MTMGW and sshd run on interface servers (0ins01, 0ins02)

Machine-to-Machine Search Interaction Diagram



Distributed Object (rpc, CtLib)
HMI (GUI, Xterm, command)
ftp
email (or other as noted)
Double line - Synchronous
email (or other as noted)
Dashed - Asynchronous

Machine-to-Machine Search & Order Interaction Diagram



End User Interaction

- **SIPS invokes remote commands via secure shell COTS (ssh)**
- **Requests are part of command line invocation**
- **ASCII message protocol (based on JEST/MOJO protocol) for requests and responses**

```
ssh –p port # g0ins01
      mtmsearch   SEARCH
      -ReturnGranuleUR   Y
      -QualificationList  "ShortName   Match   MOD021KM   MOD02HKM   MOD02QKM"
                          "RangeBeginningDate   Range   =   2000-09-01"
                          "RangeEndingDate   Range   =   2000-09-01"
      -AttributeList  "BoundingRectangle   RangeDateTime   ScienceQualityFlag
                      QAPercentCloudCover"
```

End User Interaction

- Responses via remote command UNIX standard output (stdout) to redirected SIPS terminal
- Responses in ODL or SML format (Trade Study in Progress)

SEARCHRESULT

NumberOfGranules 1000

Truncated N

ShortName MOD021KM

VersionID 001

GranuleID 1024

LocalGranuleID xxxxxxxxxxxxx

GranuleUR Sc:MOD021KM:001:1024

attr1 = value1

attr2 = value2

. . .

DAAC Operational Impacts

- Allows SIPS users to receive products not available to the general public
- Allows reordering of products that may have failed due to failed subscriptions
- Ability to track progress for SIPS orders

Configuration Parameters

- Search result limit, concurrent requests limit; default MSS userids for SIPS servers
- A separate MTMGW server can be allocated and configured for each SIPS (2-3 per DAAC)
- Requests can be limited to supported ESDTs (Landsat ESDTs will not be supported)

FTP Pull Subscriptions

Karl Bugenhagen

Raytheon

Requirements Summary

Subscriptions will support FTP pull distribution of data granules.

- **Supported by requirements in IDG**
  - **Subscription GUI will allow operators to specify FTP pull actions when entering subscriptions**
  - **Subscription Server (SBSRV) will submit FTP pull acquires to SDSRV**
  - **SBSRV will interface with the Registry to obtain valid distribution options, including FTP Pull**

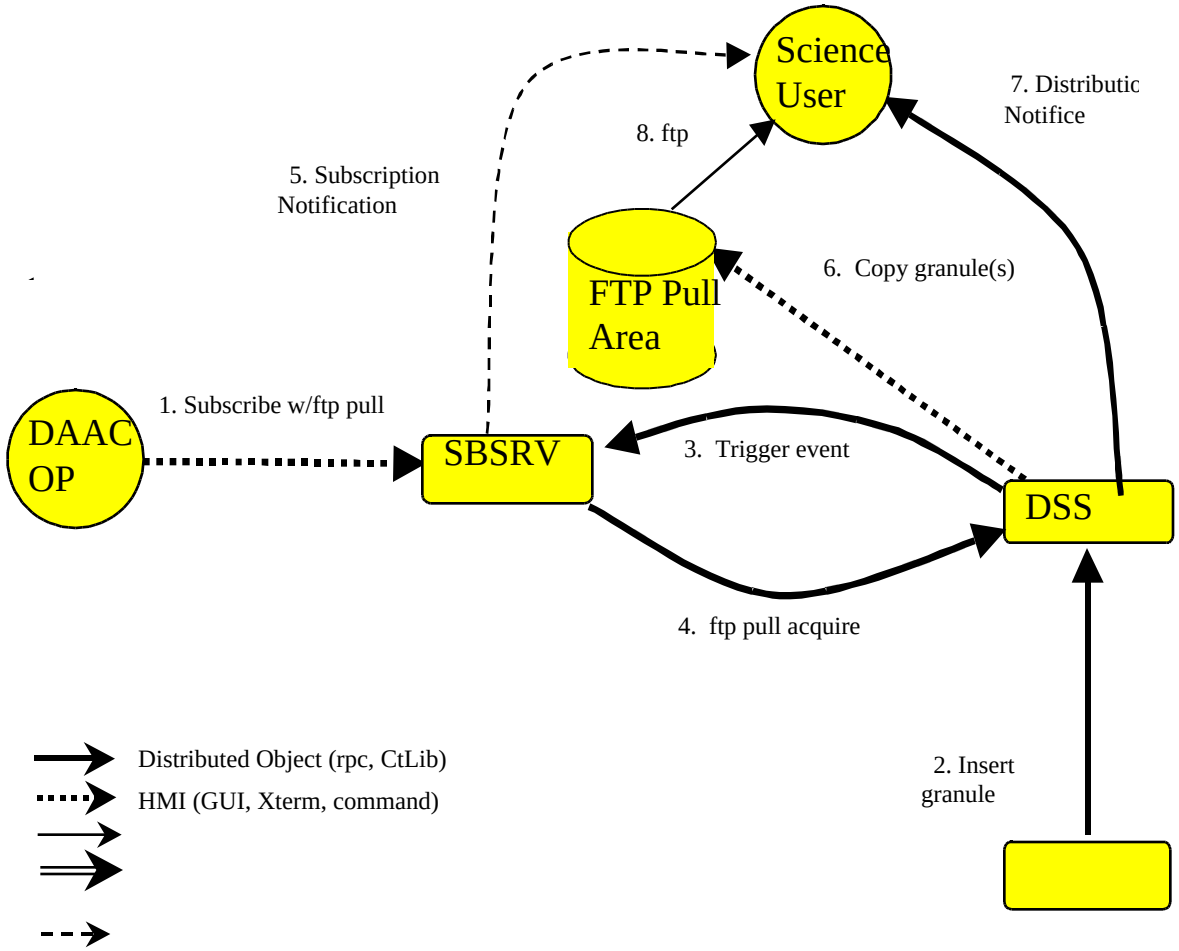
Key Design Drivers

User Interface

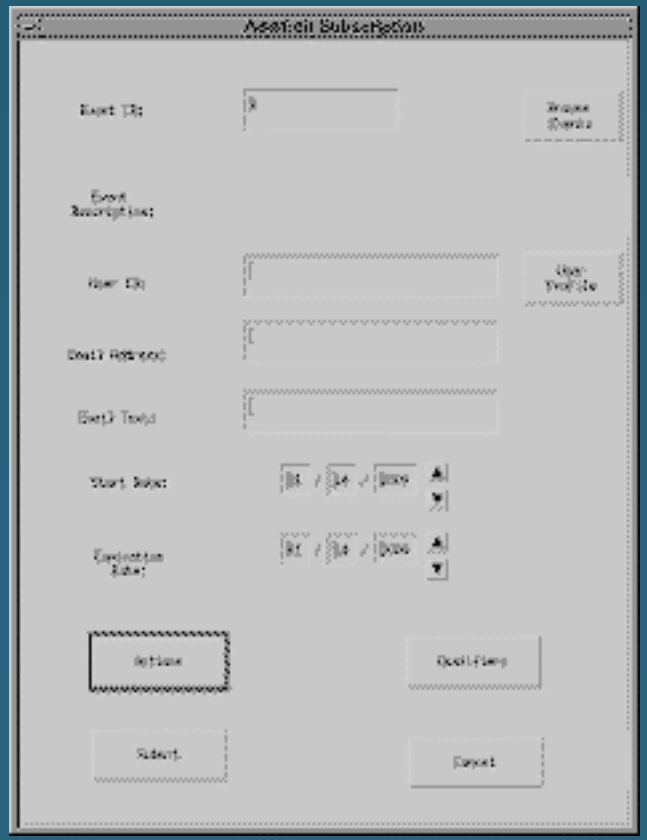
- **Immediate checking of valid distribution options for subscriptions**

No new SW or HW components

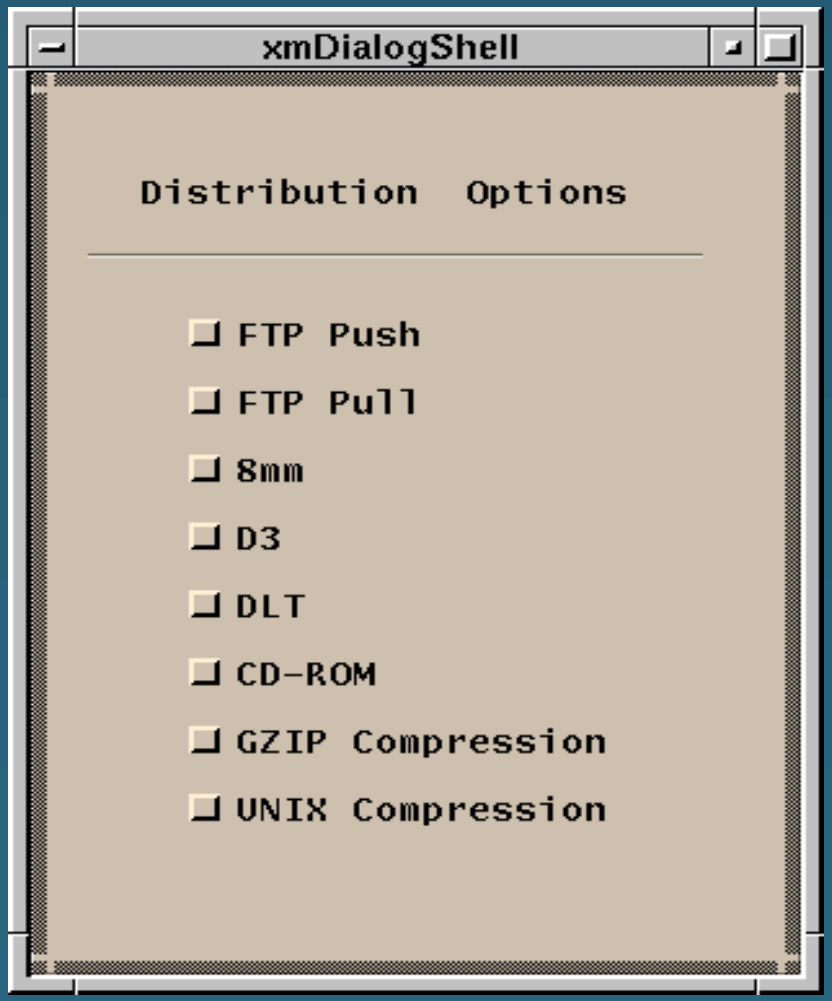
SBSRV FTP Pull Interaction Diagram



End User Interaction



End User Interaction



DAAC Operational Impacts

- Operators need to ensure that the pull subscriptions being placed won't overrun the pull area capacity at their site