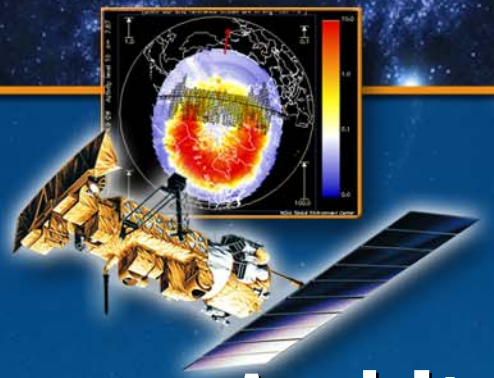
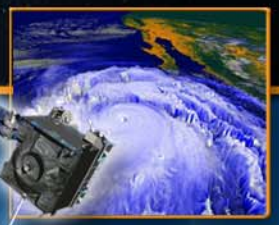
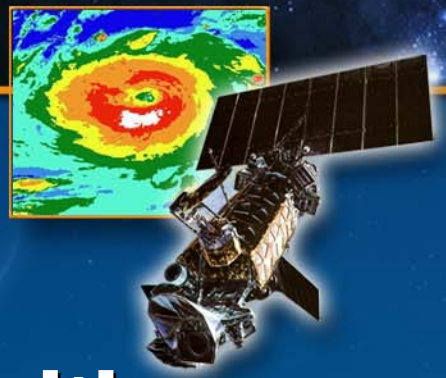

Architecting a Transition to the Next Generation

Considerations for Re-Architecting On-going Operations

Vanessa Griffin, Jennifer Frye, Les Shipley,
Paul Ondrus, and Raj Khanna

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Forward

- The National Environmental Satellite, Data and Information Service (NESDIS) has evolved over 30 years and provides nearly 100 percent weather coverage to our nation.

- It has significant challenges and is working in a structural way to:
  - Maintain its level of success
  - Provide more cost effective support
  - Accommodate significant technological and environmental challenges

Acknowledgements

- Vanessa Griffin
- Mike Settles
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- Cindy Hampton
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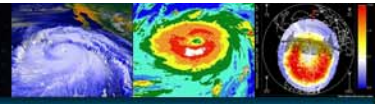
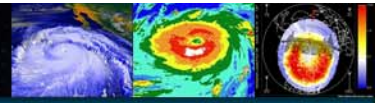
- Pat Gregory
- Matt Rose



Our Legacy

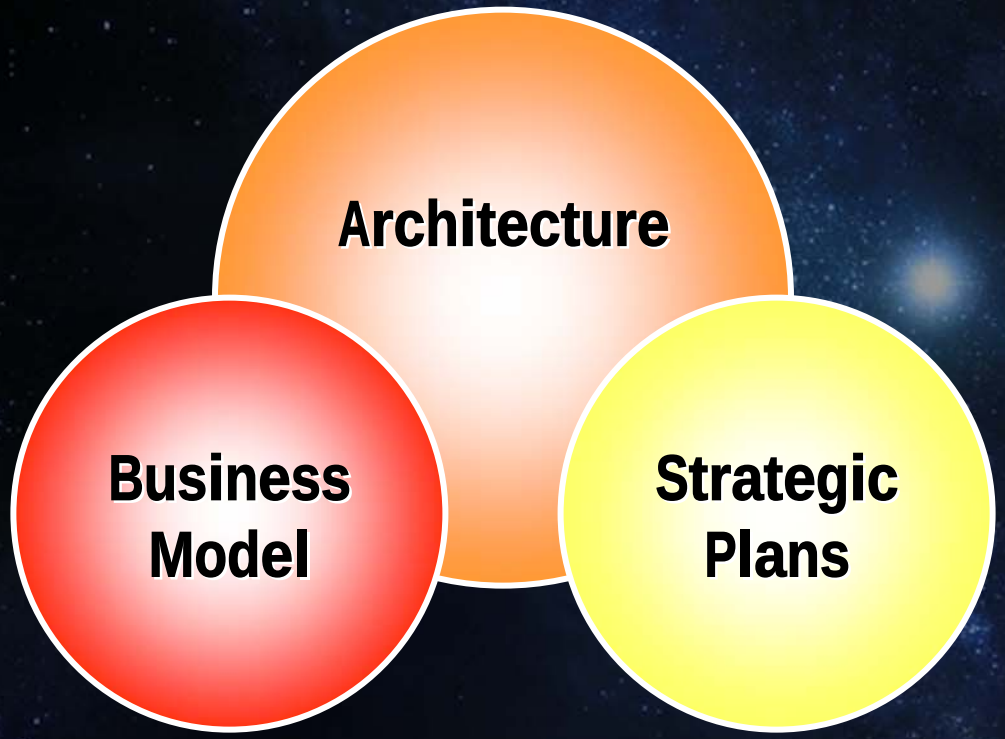
- Series of mission oriented satellite systems
  - Geostationary Operational Environmental Satellite (GOES) I-M/N-P, Polar Orbiting Operational Environmental Satellite (POES), and Defense Metrological Satellite Program (DMSP)
- Acquired as “Turn-key” systems
- Upgrade with incremental enhancements to meet evolving needs
- This has resulted in
  - Ad-hoc systems-of-systems with growing obsolescence
  - Independent systems with
    - Little or no interaction
    - That perform similar functions
    - And have common evolutionary requirements (security, acquisition, and communications)

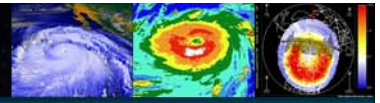


Define Success for the Architecture

- Who defines success?
  - Stakeholders
    - Customers (e.g., Public, NWS, DoD, other Federal agencies, international partners, etc.)
    - Senior management (achieving mission goals, setting quality standards, ensuring secure operations, and controlling costs)
- When (strategic and tactical planning)
  - Developing time-oriented views of needs and plans and technology
  - Projecting evolutionary changes in business relationships (e.g., more internationalization)
  - Speed of technology changes
- What defines success?
  - Understanding the costs of doing business
  - Defining the technical drivers – Performance, Reliability, Quality of measurements, and continuity of measurements (climate)
  - Identifying the schedule drivers – when is it needed and what are the benefits?
- How is success measured?
  - Performance Metrics (e.g., latency, reliability, cost, quality)

Process Elements

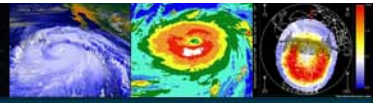




Develop Architecture Approach

- Identify architecture goals and objectives
- Identify key architecture challenges
  - Look for greatest return ($/performance)
- Development of business metrics, technical metrics, and technical trades
  - Functions, interfaces, data and information flows
- Developing consensus among business, technical and financial leaders on success criteria
- Understanding of “as is” systems and their relationships
- Prioritize re-engineering efforts

Our Architecture Development Process



Initiate Architecture Planning

NOAA and NESDIS Goals, Objectives, Architecture and Strategic Plans

Develop Roadmap

Identify Architecture Goals, and Objectives

Define Architecture Evaluation Criteria

Mission Model

Project Future Capabilities & Technologies

Project Future Needs and Reqmts.

"As-is Architecture"

"Target Architecture(s)"

Architecture Plan

Define Current Architecture

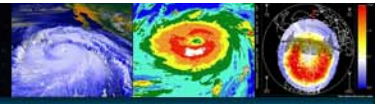
Identify Gaps and Overlaps

Identify Target Architectures

Evaluate and Select Target Architectures

Develop Roadmap

Iterate



Use of Contemporary Tools to Capture Knowledge

- Dealing with complex systems and various levels of Standards and interfaces
- Need to catalog key interfaces and understand implication of changes
- Need a tool that deals with a multi-dimensional problem
- Need to move details into structured process
- Need to maintain traceability to Enterprise Architecture
- Provides a common language (Data Encyclopedia)

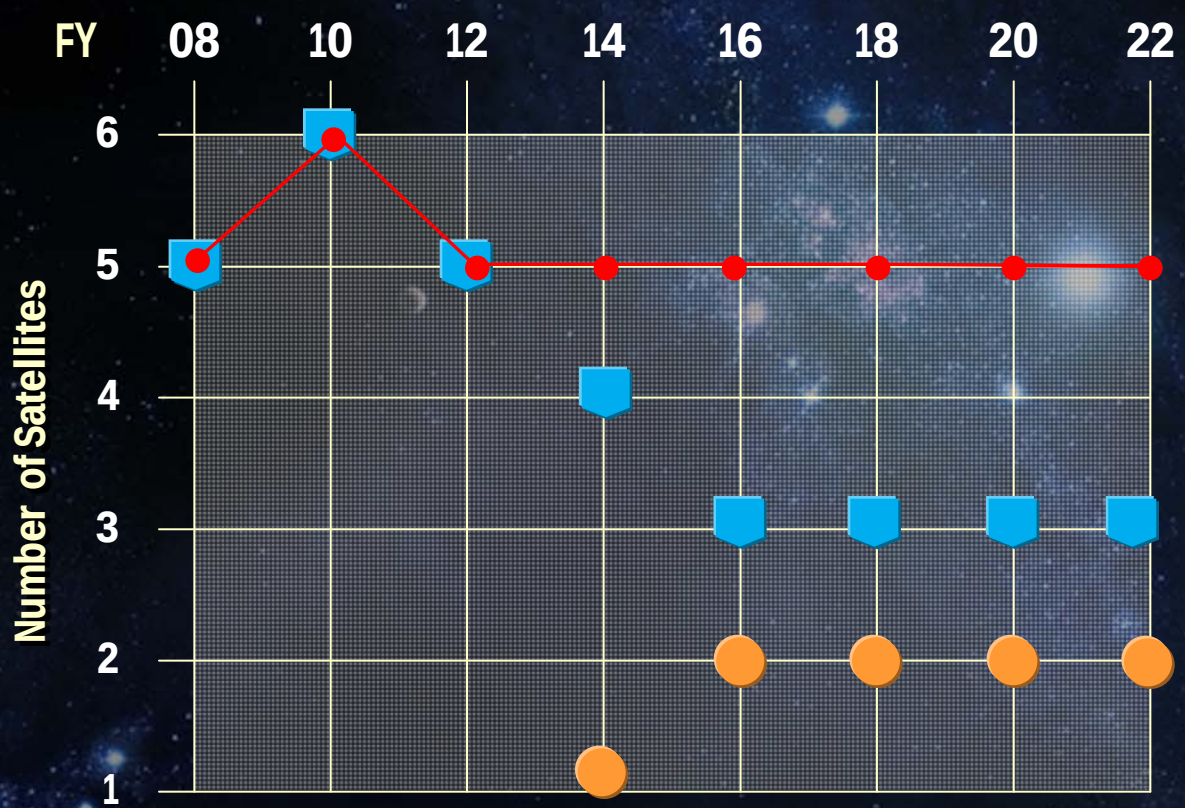
Today: Defining the Current Architecture

- Developing layered views of the architecture
  - Strategic planning, services and applications, business, data, technology, etc.
  - Started with the mission operations
- Developing frameworks for identifying, organizing, and linking elements of the current architecture
  - Functional (e.g., stewardship), Systems-of-systems (GOES-R, NPOESS)
- Identifying key interfaces
  - International (Global Earth Observation Integrated Data Environment (GEO-IDE)

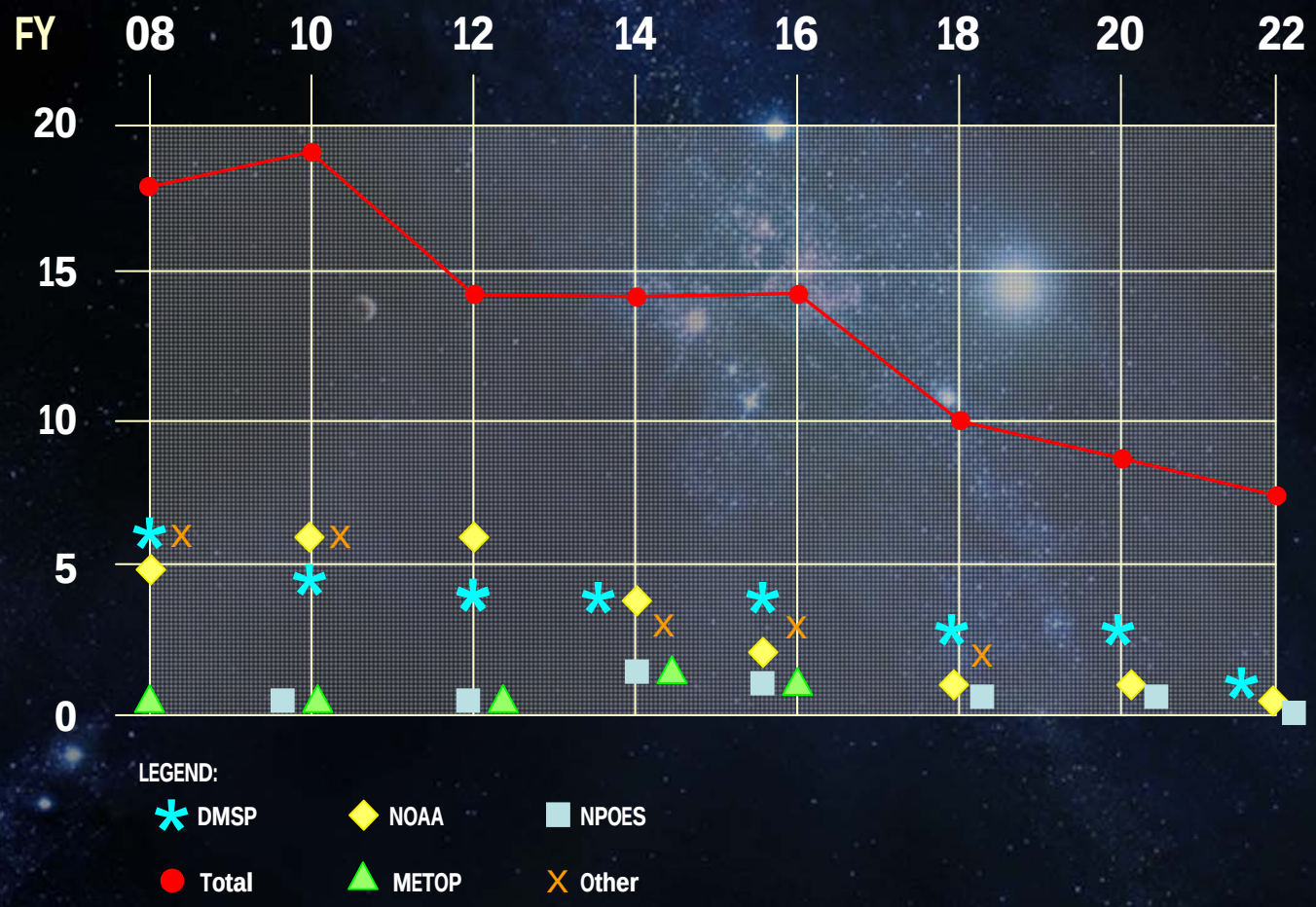
Software Integration and Test Analysis Reporting System

	GOES I-M	GOES N-P	GOES R	POES	DMSP	NPOESS
Management and Supporting Functions	IGOES SITARS	IGOES SITARS	TBD	FTT SITARS		Contractor w/ Gov. Oversight
Acquire and Transmit Data	Antennas Rx / Tx ODAPS SPS (WCDAS, FCDAS)	Antennas Rx / Tx MRS&S NTACTS (WCDAS, FCDAS)	TBD	Antennas (Fbnks) Rx / Tx LEO-T/NPAS	Antennas (Fbnks) Rx / Tx LEO-T/NPAS	SafetyNet Svalbard
Monitor and Control Satellite	GIMTACS PM FDF/OATS	GTACS DID FDF/OATS	TBD	ABE SOMS FCM SRAS	ABE MPSS FCM SRAS	Contractor
Make Data Products	SPS	SPS	TBD	ESPC		IDPS ESPC/NDE
Distribute Data Products	ESPC GVAR Tx CLASS	ESPC GVAR Tx CLASS	CLASS	ESPC CLASS		ESPC/NDE CLASS *Comm Sys Gap*
Data Quality	RPM Scheduler	RPM Scheduler	TBD	PIDES SRAS	PDS SRAS	NDE Systems

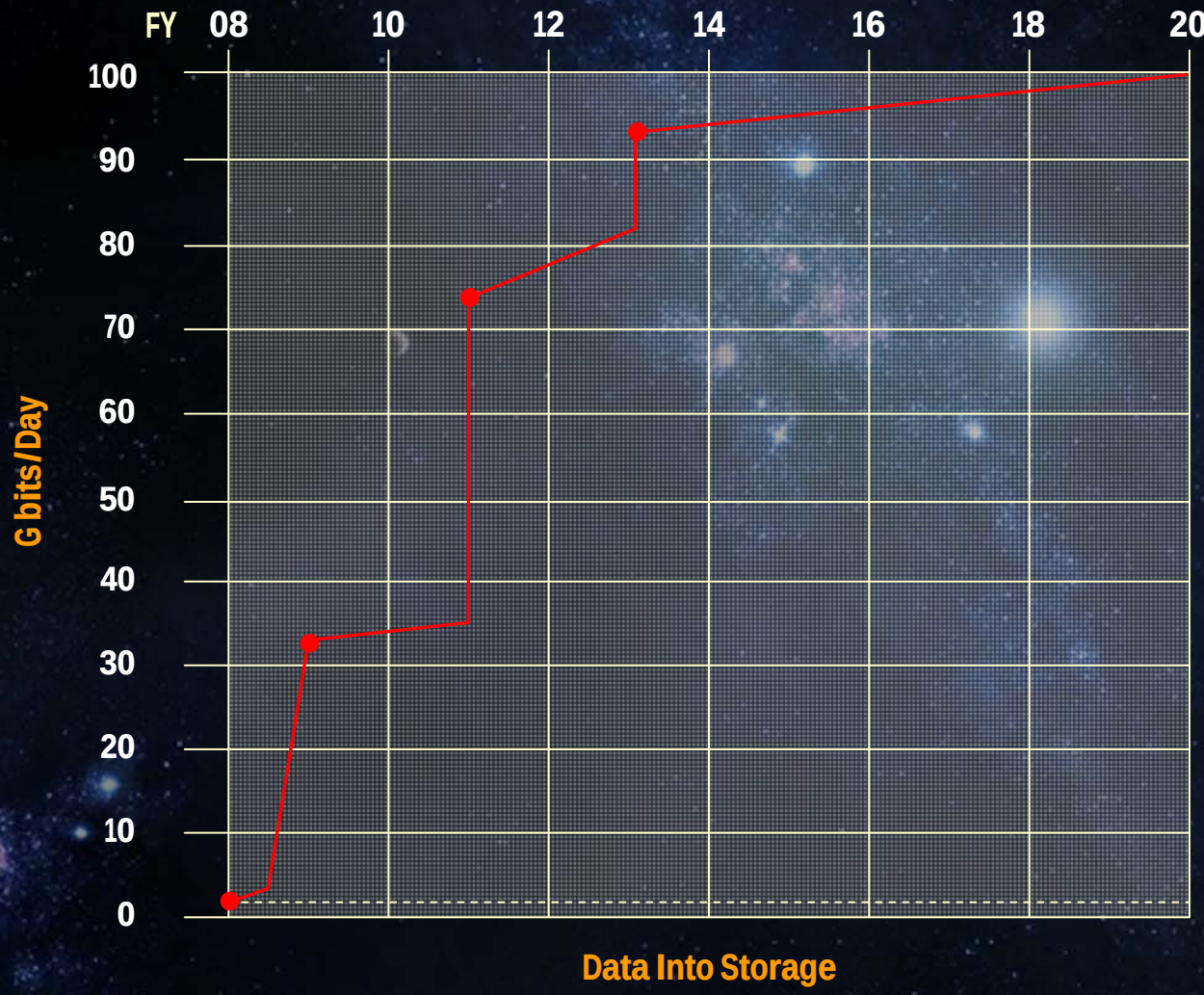
Geo Sync


FY
08
10
12
14
16
18
20
22
6
5
4
3
2
1
Number of Satellites
LEGEND:
GOES I/P
GOES R/S
TOTAL

Orbiter Mission Profile Plot



Data Volume


FY 08
10
12
14
16
18
20
100
90
80
70
60
50
40
30
20
10
0
G bits/Day
Data Into Storage

Architecture Activities Focus Areas

- Mission Area
  - Modular Elements to cover a diverse set of missions
  - Understanding of existing systems to integrate GOES-R Technology
  - More sophisticated instruments
- Data Processing
  - Reassessment of data processing flow and concept to meet changes in volume
- Archiving
  - Implication of “Stewardship” to data archiving function (data multiplier)

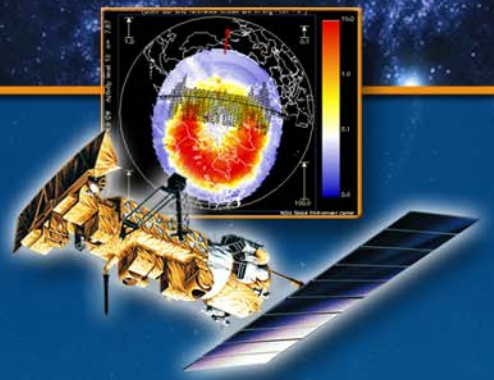
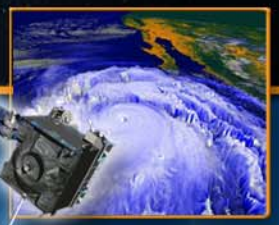
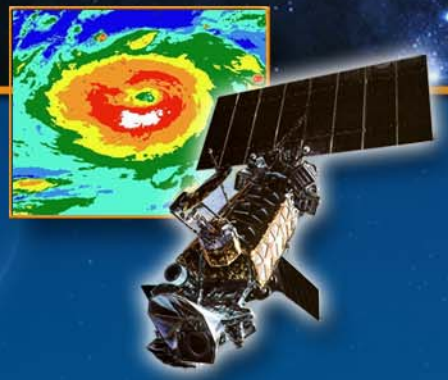
Areas of Emphasis

- Evolution of Mission Systems in the GOES-R era
- Add area of initial processing
  - Data volume change with GOES-R/NPOES
  - Anticipated extension of on-orbit assets and ground system implications
  - Establish cost effective approach for increasingly diverse mission set

Next Steps

- Capture “as is” Mission Elements to work GOES-R era Integration

- Explore options with Data Processing Interface
  - Documenting “as is”
  - Looking for cost savings options
  - Capture data processing to archive interface
  - Continue to refine approach

Backup Slides

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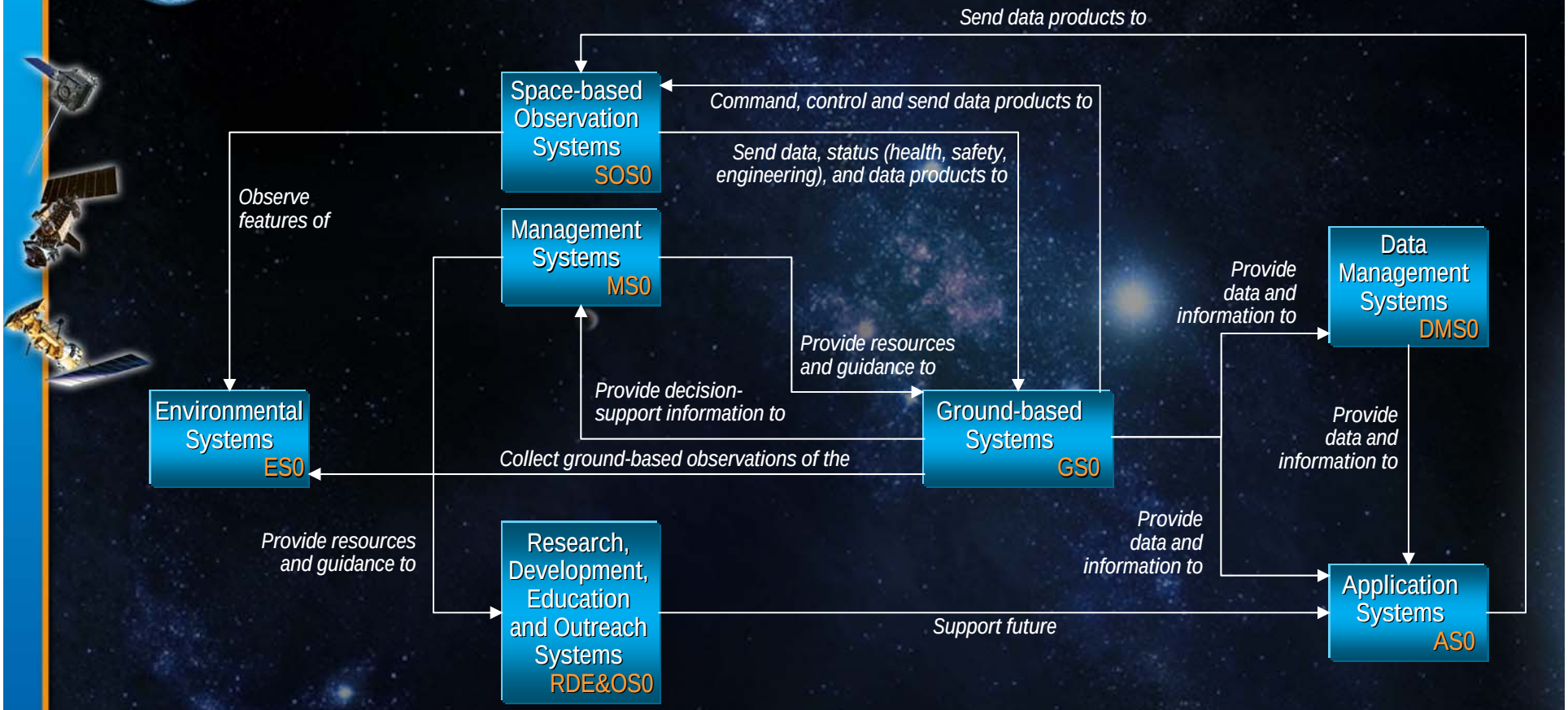
Orbiter Mission Profile

	08	10	12	14	16	18	20	22
METOP	1	2	2	1	2	1	1	1
NPOES		1	1	2	2	1	1	
DMSP	6	5	4	4	4	3	3	2
NOAA	5	6	6	4	3	2	1	1
Others (JASON/Cosmic)	6	6	2	3	3	3	2	1
Total	18	20	15	14	14	10	8	5

A System of Systems View



NOTES:

(1) A system is considered to be an assembled set of inter-related elements comprising a unified whole. Systems can be described using logical (conceptual) or physical views. Views may be partial or complete. They include all subsystems and elements required to support mission, goals, objectives and requirements as allocated or to describe constraints, physical or otherwise.

(2) Views can vary depending upon context and system definition. For example, this view shows Data Management and Applications but does not show launch systems. All of these are important architectural elements to NESDIS.

(3) Only key relationships are shown. For example, non-observational relationships pf Environmental Systems yo other systems are not shown.

Acronym List

ABE	Adaptive Browser Explorer
CLASS	Comprehensive Large Array-data Stewardship System
ESPC	Environmental Satellite Data Processing Center
FCDAS	Fairbanks Command and Data Acquisition System
FCM	Flight Control Monitor System
FDF/OATS	Flight Dynamics Facility/Orbit and Altitude Tracking System
FTT	Flight Time Table System
GAS	GOES Archive System
GIMTACS	GOES I-M Telemetry and Command System
GTACS	GOES Tracking And Command System
GVARTx	GOES Variable (GOES I-M Retransmitted Processed Data Format)
IGOES	Improved GOES Utilities
MPSS	Multi-Project Support System
MRS&N	Multi-data Use Data Link Receive System and Server
NDE	NPOES Data Exploitation System
NPAS	NOAA Polar Acquisition System
NTACTS	GOES N-O Telemetry and Command System
ODAPS	Operating Ground Equipment Data Acquisition and Patching System
PM	Product Monitor System
RPM	Replacement Product Monitor
RTACTS	Replacement Telemetry Acquisition
SITARS	Software Integration and Test Anomaly Reporting System
SOMS	Satellite Operations Management System
SPS	Sensor Processing System
SPS	Sensor Processing System
SRAS	Secure Remote Access Server
WCDAS	Wallops Command and Data Acquisition System