Future NOAA Ground System Evolution: The NESDIS Ground Enterprise Study (NGES)

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Hurricane Irma 2017
NESDIS Strategic Objectives: An Agile and Scalable Ground Capability

1. Advance terrestrial observational leadership in geostationary and extended orbits
2. Advance Space Weather observational leadership in LEO, GEO, and extended orbits.
3. Evolve LEO architecture to enterprise system of systems that exploits and deploys new observational capabilities
4. Develop agile, scalable ground capability to improve efficiency of service deliverables and ingest of data from all sources
5. Provide consistent ongoing enterprise-wide user engagement to ensure timely response to user needs
6. Deliver integrated program development to provide a suite of products and services
Developing the Next Generation Ground Around Three Principles

**Operational Resilience**
- Secure Data Management
- Operational Flexibility
- Assured Performance

**Mission Adaptability**
- Diverse Data Partners
- Agile Mission Integration
- Flexible Mission ConOps

**Long-Term Affordability**
- Predictable Operations
- Efficient Mission Integration
- Service Provider Agnostic
NESDIS finalized the NOAA Satellite Observing System Architecture (NSOSA) study in 2018

- **Cost-effective space segment architecture**
- **Programs of Record (POR’s) to 2050**
- **Establishes a target reference space architecture.**
Responding to the NSOSA Hybrid Architecture

A Future NOAA Ground System Must:

1) Securely ingest data from a wide variety of sources

1) Transform that data into advanced products

1) Exploit emerging technologies, service providers and capabilities.
### Capability Domains: Satellite, Science and Data Operations

#### Satellite Operations
- **Space-Ground Communications**
  - Ground Station Operations
  - Mission Data Backhaul
- **Mission Operations**
  - Mission Planning
  - Real-time Satellite Operations
  - Trending & Platform Management

#### Science Operations
- **Algorithm Operations**
  - Science R2O
  - Product Cal/Val
- **Environmental Information Operations**
  - Data Archive
  - Data Stewardship
  - Longitudinal Studies

#### Data Operations
- **Product Operations**
  - Data Ingest
  - Product Generation
- **Data Delivery**
  - Real Time Data Delivery
  - non-Real Time Data Delivery
Goals and Objectives of the NGES

- **Long Term Goals:**
  - Develop a disciplined, effective, and repeatable decision-making process
  - Provide analytical tools and architectural products that support subsequent planning and implementation

- **Objectives:**
  - Establish a baseline Ground Enterprise target architecture for the 2035-2050 timeframe
  - Build Capability Roadmaps to guide investment decisions for the coming decade
Strategic Foresight – An Agile Approach to the Future

Visioning the Future
Imagining possible preferred and un-preferred futures

Baselining the Future
Where we think the future is likely headed given current knowledge

The Future Mindset Model

Past               Present          Future

Black Swan (unimaginable unknowns)
Plausible

Preferred Future
Possible

Expected Future
Probable

Unpreferred Future

Wild Card (imagined unknowns)
Enterprise Ground System Trade Space

- **Cloud Deployment**
  - Commoditized ubiquitous compute platform capabilities change the way users interact with each other and how NESDIS interacts with the environmental data enterprise

- **Product Services**
  - Changing product service modalities affects how NESDIS supports Stakeholder product needs

- **Analytical Services**
  - New analytics tools/techniques change the way data is both provided by NESDIS and consumed by Stakeholders

- **User Communication Services**
  - New data delivery solutions will change the way end-users consume data

- **Enterprise Data Acquisition Services**
  - New data acquisition and command & control flexibility

- **New Space**
  - New data provider technologies will change NESDIS processes for satellite, data & science operations
The NGES Model

Functional Objectives

Strategic Objectives

Anticipated Technologies

Develop

Ground System

Concepts

Model Costs

Score against Priorities and Strategic Objectives

Inform and Refine
The NGES Model

- Follows a model of a series of relatively short end-to-end design cycles
  - Agile Approach
  - Initial cycle is low fidelity looking for major architectural levers
  - Subsequent cycles are more focused on “interesting” alternatives
  - Subsequent cycles can incorporate unanticipated user needs, insights from the technology foresight process, additional flight architectures & ground architecture alternatives
Summary

• **The NGES study is integral to the NESDIS Reimagine Strategic Objectives**

• **The NGES study completes the analysis needed for the NSOSA vision to provide an integrated, adaptable and affordable enterprise for Space & Ground operations**

• **The NGES will provide a set of Ground Enterprise Capability Portfolio management & decision support products & processes**