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

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NOAA / NESDIS / OSAAP
# NESDIS Strategic Objectives: An Agile and Scalable Ground Capability

<table>
<thead>
<tr>
<th>Objective</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Advance terrestrial observational leadership in geostationary and extended orbits</td>
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<td>2</td>
<td>Advance Space Weather observational leadership in LEO, GEO, and extended orbits.</td>
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<td>3</td>
<td>Evolve LEO architecture to enterprise system of systems that exploits and deploys new observational capabilities</td>
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<td>4</td>
<td>Develop agile, scalable ground capability to improve efficiency of service deliverables and ingest of data from all sources</td>
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<td>5</td>
<td>Provide consistent ongoing enterprise-wide user engagement to ensure timely response to user needs</td>
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<td>6</td>
<td>Deliver integrated program development to provide a suite of products and services</td>
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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.

Putting that capability together is the challenge we are going to address.
# Capability Domains: Satellite, Science and Data Operations

## NESDIS Ground Enterprise

<table>
<thead>
<tr>
<th>Satellite Operations</th>
<th>Science Operations</th>
<th>Data Operations</th>
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<tbody>
<tr>
<td><strong>Space-Ground Communications</strong></td>
<td><strong>Mission Operations</strong></td>
<td><strong>Product Operations</strong></td>
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<td>- Ground Station Operations</td>
<td>- Mission Planning</td>
<td>- Data Ingest</td>
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<tr>
<td>- Mission Data Backhaul</td>
<td>- Real-time Satellite Operations</td>
<td>- Product Generation</td>
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<td><strong>Mission Operations</strong></td>
<td><strong>Algorithm Operations</strong></td>
<td><strong>Data Delivery</strong></td>
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<td>- Mission Planning</td>
<td>- Science R2O</td>
<td>- Real Time Data Delivery</td>
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<td>- Real-time Satellite Operations</td>
<td>- Product Cal/Val</td>
<td>- non-Real Time Data Delivery</td>
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<tr>
<td>- Trending &amp; Platform Management</td>
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<td><strong>Algorithm Operations</strong></td>
<td><strong>Environmental Information Operations</strong></td>
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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

The Future Mindset Model

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

**Visioning the Future**
Imagining possible preferred and un-preferred futures

**Key Decision**
Signposts to Watch
Black Swan Event
Solution
Transition
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

Cost/Benefit vs. Relative Cost

Performance Score
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