



NSSL Phase 3 Mission Assurance Framework for NDIA Conference

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THEORY OF VICTORY = SPACE SUPERIORITY



“ *In the long haul, our safety as a nation may depend on our achieving ‘Space Superiority.’ Several decades from now the important battles may not be sea battles or air battles, but space battles...* ”

- General Schriever
1957



Why Now?...

Trends Driving Space Access & Mobility Growth

TREND AREA	PAST	CURRENT/FUTURE
Space Domain	Peaceful	Contested
Launch Customer	Government preponderance	Commercial preponderance
Launch Cadence	10+ per year	100+ per year
Installations	Major Range and Test Facility Base	Spaceport model and charging rules
Spaceport Capacity & Availability	Two Government installations Excess capacity	Multiple Spaceports to meet Increasing Demand
Assured Access	Government ensures a minimum of 2 commercial providers are available	Multiple commercial launch systems in development, testing and flight
Delivery	Satellites to space	Satellites and materiel to, through, and from space
On-Orbit Servicing/Refueling	Niche Government ability (Space Station, Hubble)	Multiple commercial investments in refueling, servicing, and movement

Multiple changes are driving the USSF from a Launch to a Logistics Model



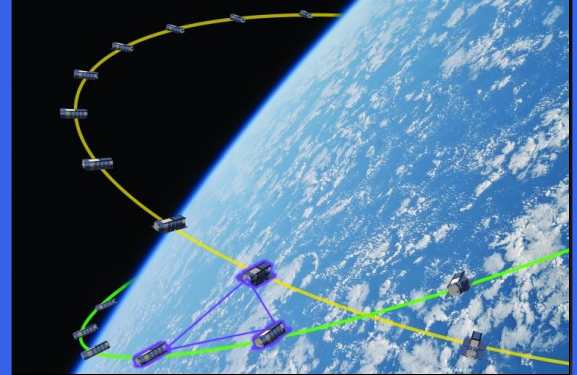
Launch Programs

98 Successful NSSL Launches



>\$84B in On-Orbit Capability

Enables Resilient Space Order of Battle



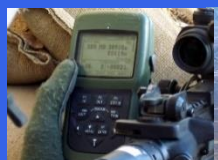
USSF launches the most critical National Security Space satellites



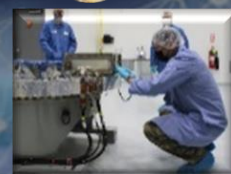
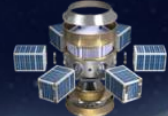
Nation's Eyes & Ears



Secure Comms



Positioning, Navigation & Timing



Multi-Mission Manifesting

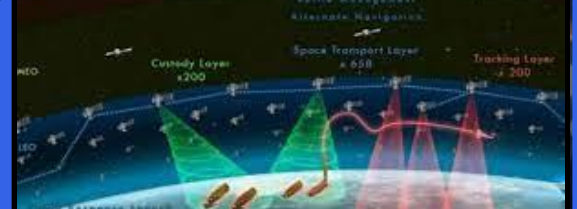
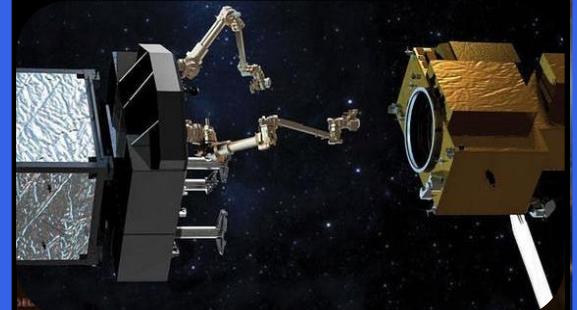
Govt Mission Assurance = 100% Mission Success



23 of 25 Successful RSLP Launches Since 2015



Space Domain Awareness



100% Launch Success is Vital to Countering the Pacing Challenge

SPACE ACCESS

AATS Inherent Activities

LTRS - Range Sustainment; Materiel and Services	Operate Vandenberg SFB, Patrick SFB, Cape Canaveral SFS, Eastern and Western Ranges	Procurements; NSSL, RSLP; Multi-Mission Manifesting
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Orbital/Sub-Orbital Launches; Storage, Surveillance, and Refurbishment of Decommissioned ICBM Motors

National Federation of Spaceports



USG and State Spaceport Collaborations

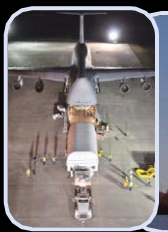


Commercial Range Ops & Business Models	Multi-Use Range Facilities; Complex Allocation	Next-Gen Range Services & Mission Assurance
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Mission Lifecycle Management

SV Processing Management; Building Capacity

AATS-Level Ops Centers for Monitoring Hardware Movements and Assets



OPERATIONS INTEGRATION

Spaceports/Launch/Satellite Ops

SSC/S3

SSC Spaceflight Worthiness & Certification
Enterprise Mission Assurance Team
COCOM Space Effect Integrator
DoD Mission Manifesting



AATS AA3/5/8

AATS Program Incubator
AATS Policy, Requirements & Funding



RAPID DELIVERY

Sub-Orbital/Orbital Rapid Strategic Mobility

Rocket Cargo
AFRL Vanguard Program;
Point-to-Point Rapid Global Mobility

On-Orbit Storage and Delivery in and from Space



ORBITAL RESILIENCY

Tactically Responsive Space

Provide responsive launch for TacRS on-demand delivery of space capabilities to the warfighter through all phases of conflict

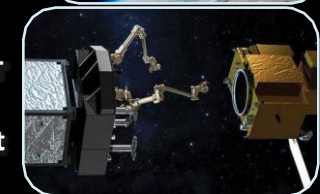


On-Orbit Servicing, Maneuver, & Debris Removal

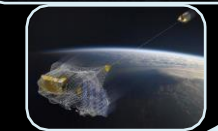
Orbital Servicing
Remove/Replace Payloads On-Orbit;
Drive Common Standards;
Commercial Refueling Capability



Orbital Maneuver
Leverage commercial industry for on-orbit maneuvers;
Small-launch to LEO, use on-orbit stages to higher altitudes



Debris Removal
Engage and Energize Industry Solutions





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AATS Footprint and Relationships

Air Force Research Laboratory

AtlasX

Boca Chica, TX

Camp Navajo

Catalyst Campus

Cecil Air and Space Port

Colorado Air and Space Port

Defense Innovation Unit

Fort Wingate

Hill AFB

Houston Spaceport

Huntsville Int'l Air & Space Port

Missile Defense Agency

Mojave Air and Space Port

Nat'l Security Innovation Network

Oklahoma Spaceport

Pacific Missile Range Facility

Pacific Spaceport Complex

Pillar Point AFS

SOFWERX

Silicon Mountain Tech

Space Florida

Spaceport America

Space Coast Regional Airport



- Jonathan Dickinson Missile Tracking Annex
- Kennedy Space Center
- Mid-Atlantic Regional Spaceport
- Malabar Transmitter Annex
- Midland Spaceport

- AATS Personnel Assigned
- Spaceports
- Mission Relationship

- Spark Cells
- Space CAMP
- Spaceport Camden
- SpaceWERX
- Univ of Central Florida
- White Sands Missile Range
- Wake Atoll
- Wallops Flight Facility
- Yuma Proving Ground

➤ 2 USSF Launch and Test Ranges, 3 Tracking Sites, 10,000+ Personnel, 10 Locations
 ➤ 100+ U.S. and International Partners/Relationships Across Government, Industry, and Academia

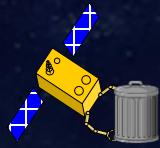
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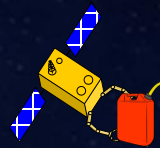
What We Do - PEO Assured Access to Space

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Delivering and sustaining warfighting capability into, from, and through space



Disposal Operations



On-Orbit Refueling



On-Orbit Servicing



On-Orbit Movement



DEBRIS MITIGATION

ON-ORBIT OPS

GROUND OPS



Point-to-point Logistics



Launch Vehicle Recovery



MISSION ASSURANCE AND ENGINEERING

Warfighting Requirements

Commercial Requirements

Space Vehicle Contracting

Launch Service Task Orders – NSSL/Small



Space Vehicle Production

Space Vehicle Movement



Space Vehicle Processing

Launch Vehicle Contracting



Launch Vehicle Production

Services Task Orders

Launch Vehicle Movement



Maintenance/Sustainment/Modernization

Launch Vehicle Processing

Integration

Launch Operations

Scheduling



Range Operations

LONG RANGE PLANNING AND ACQUISITIONS

GENERATION

EXECUTION

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Introduction

- **What is Launch Mission Assurance?**

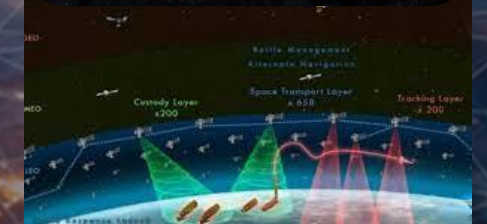
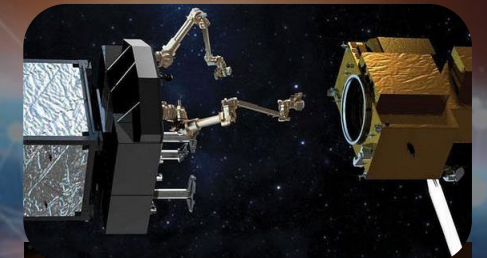
Disciplined application of proven scientific, engineering, quality, and program management principals towards achieving mission success

- **Why do we want to change it?**

Evolving NSS environment, architectural planning, and mission requirements suggest need for Tiered Mission Assurance approach to balance cost vs risks

- **How is it being changed to procure launch services for missions in 2025-2030?**

Tiered Mission Assurance framework incorporates adaptive Mission Assurance principles and takes advantage of launch industry innovations while enabling USSF to meet future launch manifest, focus risk tolerance appropriately, and build resiliency to provide assets warfighter needs



Tiered Mission Assurance Framework is key enabler for Assured Access to Space (AATS)



Mission Assurance

Enablers

Non-Recurring Design Validation

Qualify the Design
Margins and Reliability

Qualify the Processes
Ability to Reliably Produce Designs

Qualification by Testing
Verify Failure Modes and Limits of Design

Sets foundation

Mission Specific Assessment

Identify Build Deficiencies of Flight
Configuration and Evaluate in Accordance
with Qualified Design

- Standards, guide, and command media
- Verification and validation
- Qualification testing and anomaly resolution
- Qualification of the manufacturing process
- Qualification of inspection processes
- Analytical design margins
- Characterization of launch environments
- Formulation of acceptance testing
- Failure modes effects and analysis
- Qualification of launch parameters

- Build verification
- Evaluation of discrepant conditions
- Analysis of inspection and acceptance data
- Review of repairs and refurbishment
- Flight and post-flight support



Lane 2



Upfront Commitment

Commitment to assure
access to space for missions
that cannot fail
[Full NSSL Mission Assurance]

Lane 1



Rolling Competitions

On-ramp new systems &
emerging providers for missions
that are more risk tolerant
[Tiered Mission Assurance]

Phase 3 Dual Lane Motivation

- Provides annual opportunities so systems in development can on-ramp when ready
- Provide additional resiliency through new launch systems
- Secures launch capacity/AATS
- Provides consistent demand, gain EoQ
- Addresses manifest flexibility
- Ensures capability for hard missions

EoQ: Economic Order Quantities
NSSL = National Security Space Launch
AATS = Assured Access to Space



Tiered Mission Assurance Framework

Mission Assurance Tiers	Non-Recurring and Mission Specific Activities	Typical Payload Risk Class / Acceptable LV Risk	General Scope
NSSL Lane 2	Full - Comprehensive review of ctr data and processes; full IV&V	A / Low	All Flight and Ground Critical Items
NSSL Lane 1 Tier 3	Moderate - Review contractor data & process; targeted IV&V based on identified elevated risks & anomalies	B / Low-Medium	All Flight and Ground Critical Items
NSSL Lane 1 Tier 2	Some - Selective review of contractor data and processes	B / Low-Medium	(5) Launch Vehicle Subsystems (5) Ground Subsystems Launch Critical Items (Ground)
NSSL Lane 1 Tier 1	Minimal - Limited review of contractor data and processes	C or D / Medium or High	(1) Launch Vehicle Subsystem Launch Critical Items (Ground)
NSSL Lane 1 Tier 0	No Mission-specific Mission Assurance (Public Safety Review only)	C or D / Medium or High	No additional Government mission assurance

Tiered MA enables USSF to “dial” MA scope to match with acceptable risks for Lane 1 missions



Tiered MA Scope Example

Full MA Scope

Hardware Reviews; Flight Mechanics, Guidance and Navigation; Flight Controls, Dynamics and Loads; Thermal, Fluids, and Contamination; Software; DOL Software Load Verification; DOL; DOL Placards; DOL Winds Analysis; Structures; Orbital Debris Mitigation Data; Booster Propulsion Analysis; Upper Stage Propulsion Analysis; Solid Rocket Booster; Rocket Engine(s); Avionics; Ground Software Baseline; Ground Support Equipment; and Launch Site Operations ...



**Tailored based on
Tiered Mission
Assurance Framework**

Tier 0 MA Scope

Tier 1 MA Scope

Hardware Reviews of Engines and Motors; ...

Tier 2 MA Scope

Hardware Reviews of Propulsion, Separation, Fairing, and Tank Systems; Guidance and Navigation; Dynamics and Loads; ...

Tier 3 MA Scope

Hardware Reviews of Flight Critical Items; Mostly Review of Contractor Documentation; Targeted IV&V; ...



Tiered Mission Assurance Framework

Tier 0

NRE and MSA Tasks
Consistent w/
Commercial Missions

(Space Force Public
Safety Review)

No GMD

“Very Minimal” Space
Flight Worthiness
Certification

Tier 1

Deviations from (1) Launch Vehicle
Subsystem and Launch Critical Items
(Ground) Qual Baseline

Deviations to Tiered MA Plan Allowed w/
Risk Assessment

High risks must be mitigated to Medium

Review Top NCs; QTP/ATP/NCs for
Mission Unique and FFI

Very Small DOL Ops Team w/ Gov MD

“Minimal” Space Flight Worthiness
Certification

Tier 2

Deviations from (5) Launch Vehicle and
(5) Ground Subsystems and Launch
Critical Items (Ground) Qual Baseline

Deviations to Tiered MA Plan Allowed w/
Risk Assessment

Medium+ risks must be mitigated to
Low-Medium

Review Top NCs; ATP/NCs for Flight
Critical HW (1st Flt), then will reduce

Small DOL Ops Team w/ Gov MD

“Some” Space Flight Worthiness
Certification

Tier 3

Deviations from Flight and Ground
Critical Items Qual Baseline

Deviations to Tiered MA Plan Allowed w/
Risk Assessment

Medium+ risks must be mitigated to
Low-Medium

Review Top NCs; ATP/NCs for Flight
Critical HW

Full DOL Ops Team

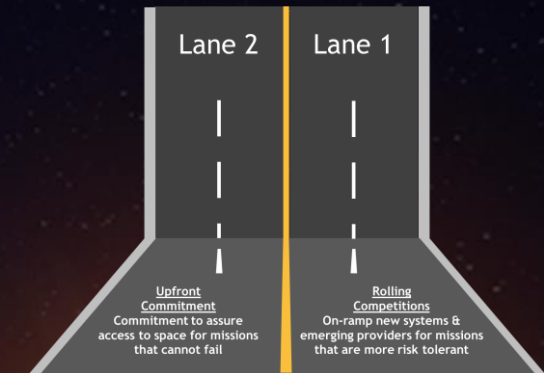
“Moderate” Space Flight Worthiness
Certification

Enables USSF to meet future launch manifest, focus risk tolerance appropriately, and build resiliency to provide assets warfighter needs



Summary

- Dual lane approach will provide Assured Access to Space to integrated space architecture at affordable prices
- Tiered Mission Assurance approach developed to support dual lane approach in balancing cost vs mission risks due to evolving NSS environment, architectural planning, and mission requirements
- Lower MA tiers consist of less scope and accept higher risk, whereas Higher MA tiers consist of more scope and accept lower risk
- Enables USSF to meet future launch manifest, focus risk tolerance appropriately, and build resiliency to provide assets warfighter needs



Mission Assurance Tiers	Non-Recurring and Mission Specific Activities	Typical Payload Risk Class / Acceptable LV Risk	General Scope
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OSP-4 (Non-ACAT)	SEI MA tailored to small R&D payloads and small LV	C or D / Medium or High	





Acknowledgement



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Thank You - Q&A Session