



# Assured Access to Space: An Introduction to Space Logistics

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# US Space Force Warfighting Architecture


***Space…Supporting the Joint Fight***

***Accelerating via Space Systems Command's Exploit - Buy - Build***

# What is “Space Logistics”?

**Logistics** – planning and executing the movement and support of forces (***JP-04, Joint Logistics, May 2019***)

**Joint Logistics Enterprise** – a multitiered matrix of key ***global logistics providers*** cooperating and structured to achieve a unity of effort without jeopardizing the integrity of their own organizational mission and goals (***JP-04, Joint Logistics***)

**Space Mobility and Logistics (SML)** – the movement and support of military equipment and personnel ***into*** the space domain, ***from*** the space domain back to Earth, and ***through*** the space domain (***Space Capstone, Aug 2020***)

***Space logistics…increasingly integral to Joint Warfighting Capabilities***

# "Space Logistics": Evolving Terminology

## ISAM = In-Space Servicing, Assembly, and Manufacturing

Highlights assembly, manufacturing, and broadly covers maneuver and servicing *(National Science and Technology Council ISAM National Strategy)*

## OSAM = On-orbit Servicing, Assembly, and Manufacturing

Highlights servicing, assembly, and maneuver (NASA)

## SML = Space Mobility and Logistics

USSF defined core competency addressing space access, replenishment of consumables, on-orbit servicing (*Space Capstone Publication, SPACEPOWER)*

## SMS = Space Maneuver and Servicing

Identifies validated capability gaps for on-orbit mobility and servicing
*(SMS Initial Capabilities Document (ICD))*

## SAML = Space Access, Mobility, and Logistics

Describes Space Access, Mobility, and Logistics
(SAF/SQ Mission Area Team / SSC AATS)

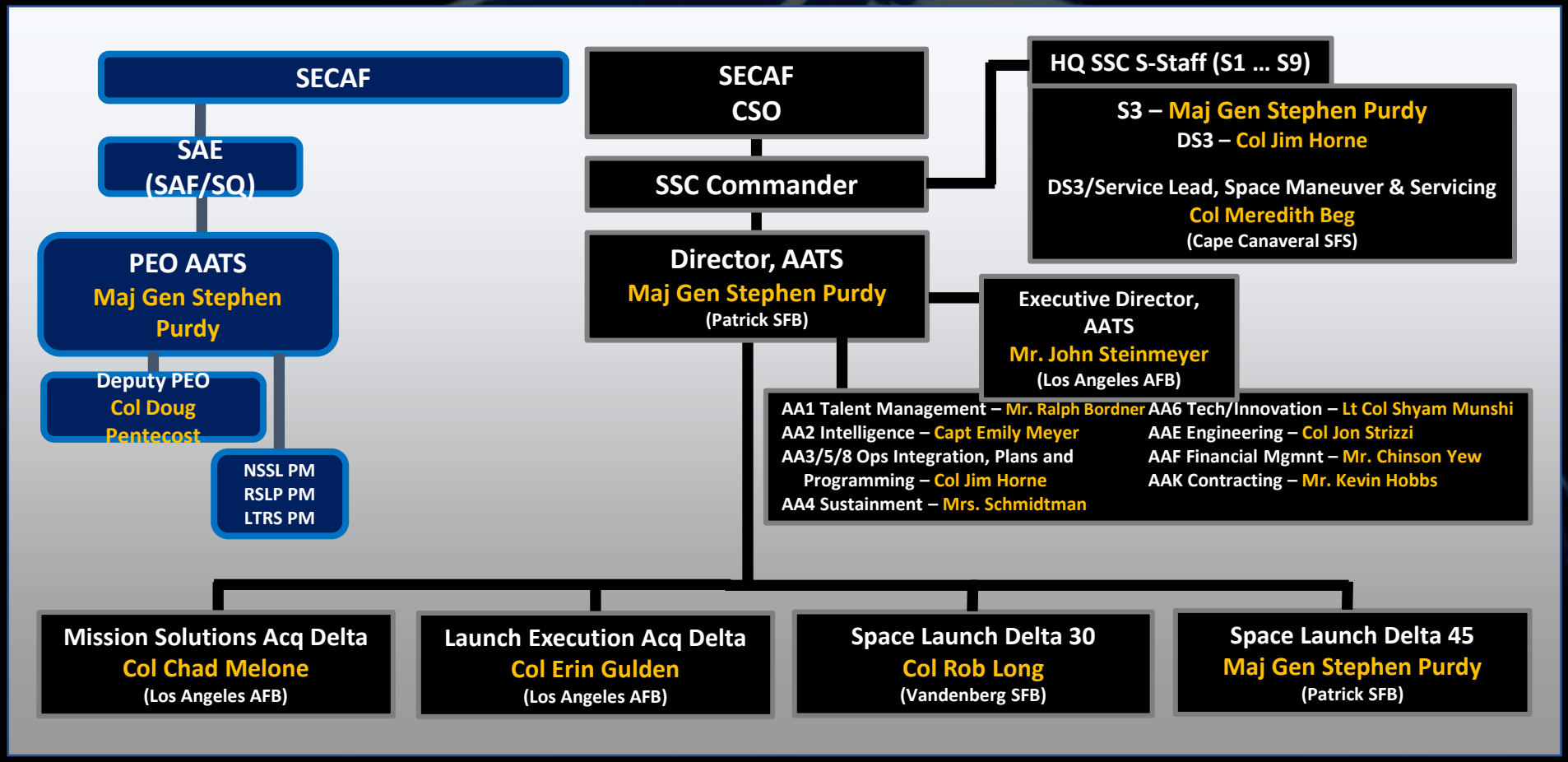
***Evolving terminology for an Evolving Mission Area***

# Why Now?...Trends Driving Space Logistics Growth

| TREND AREA | PAST | CURRENT/FUTURE |
|---|---|---|
| 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 | Excess capacity | Demand exceeds supply |
| 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 material to, through, and from space |
| On-orbit servicing/refueling | Niche Government ability (Space Station, Hubble) | Multiple commercial investments in refueling, servicing, and movement |
| Spaceport Availability | Two Government installations | Multiple Government, commercial, and allied spaceports |

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

# Who We Are

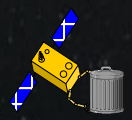

SECAF
SAE (SAF/SQ)
PEO AATS
Maj Gen Stephen Purdy
Deputy PEO
Col Doug Pentecost
NSSL PM
RSLP PM
LTRS PM
SECAF CSO
SSC Commander
Director, AATS
Maj Gen Stephen Purdy
(Patrick SFB)
HQ SSC S-Staff (S1 … S9)
S3 – Maj Gen Stephen Purdy
DS3 – Col Jim Horne
DS3/Service Lead, Space Maneuver & Servicing
Col Meredith Beg
(Cape Canaveral SFS)
Executive Director, AATS
Mr. John Steinmeyer
(Los Angeles AFB)
AA1 Talent Management – Mr. Ralph Bordner
AA2 Intelligence – Capt Emily Meyer
AA3/5/8 Ops Integration, Plans and Programming – Col Jim Horne
AA4 Sustainment – Mrs. Schmidtman
AA6 Tech/Innovation – Lt Col Shyam Munshi
AAE Engineering – Col Jon Strizzi
AAF Financial Mgmnt – Mr. Chinson Yew
AAK Contracting – Mr. Kevin Hobbs
Mission Solutions Acq Delta
Col Chad Melone
(Los Angeles AFB)
Launch Execution Acq Delta
Col Erin Gulden
(Los Angeles AFB)
Space Launch Delta 30
Col Rob Long
(Vandenberg SFB)
Space Launch Delta 45
Maj Gen Stephen Purdy
(Patrick SFB)

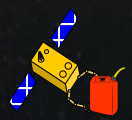
# Where We Are

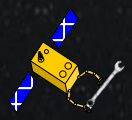

- 2 USSF Launch and Test Ranges, 3 Tracking Sites, 10,000+ Personnel, 10 Locations
- 100+ U.S. and International Partners/Relationships Across Government, Industry, and Academia

# What We Do - PEO Assured Access to Space

*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

Warfighting Requirements

Commercial Requirements

**MISSION ASSURANCE AND ENGINEERING**

Space Vehicle Contracting

Launch Vehicle Contracting

Spaceport Strategy

Launch Service Task Orders – NSSL/Small


Space Vehicle Production



Launch Vehicle Production

Services Task Orders

Space Vehicle Movement


Space Vehicle Processing

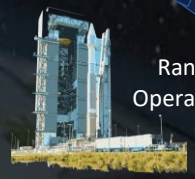
Launch Vehicle Movement


Launch Vehicle Processing

Maintenance/ Sustainment/Modernization

Integration Scheduling


Launch Operations


Range Operations

**LONG RANGE PLANNING AND ACQUISITIONS**

**GENERATION**

**EXECUTION**

# Trend – Increased Launch Cadence

## Launch Rates Dramatically Increasing

| | ’21… | ’22… | ’23 |
|---|---|---|---|
| Eastern Range: | 31… | 57… | (92) |
| Western Range: | 11… | 19… | (42) |

Example On-Orbit Commercial Systems

- Starlink /Starshield
- OneWeb
- Kuiper
- PredaSAR
- *Many more…*

# Trend – Rocket Cargo

SDDC

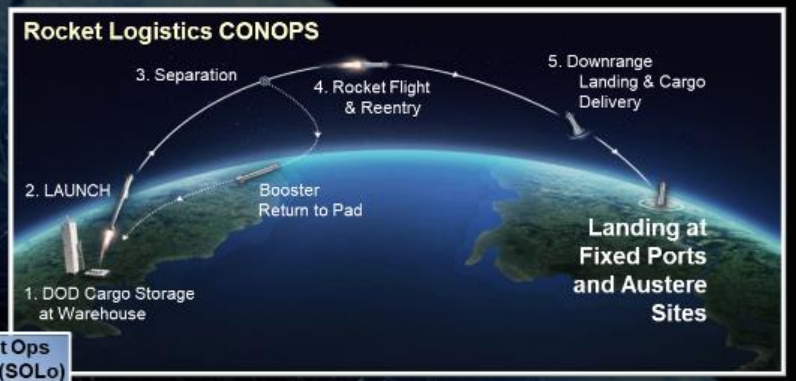
MSC

AMC

Land

Sea

Air




No existing pathway to provide Rocket-based strategic delivery

Brings **Space** to the Mobility Fight


**Milestones to USTRANSCOM Integration:** Leverage Commercial Rockets – *No Gov't development of Rocket or Reentry Vehicle*

- Rocket Cargo Acquisition Program providing ***Minimum Viable Product (MVP)*** Rocket-based delivery system
- USSF executing phased Combatant Command Component stand up (TRANSCOM)
- SSC/AATS posturing OT&E COAs to establish AATS as the Space ***Sustainment Operations and Logistics (SOLo) Component*** for executing both sub-orbital point-to-point and future orbital point-to-point cargo delivery operations (organized and trained mobility operators)
- USTRANSCOM Gen Sullivan directed cross-functional team to ***integrate RC into transport Allocation Process*** to support COCOM needs

***USSF creating command pathway and operational linkage to bring RC to the light***

# Trend – On Orbit Servicing

Commercially Provided

## Orbit Repositioning

- Move assets at will
- Decommission at end-of-life

## Upgrade/Repair via Modularity

- Enable high-performance processing
- Upgrade electronics / sensors
- Upgrade with new capabilities
- Evolve capabilities along with missions and threats
- The "Immortal Spacecraft"

## Autonomous RPO-Docking

- Inspection and characterization
- Multi-agent collaboration
- Explore disaggregation beyond LEO

Joint Civil/DoD

## XGEO Operations

- Enable and protect commercial shipping lanes
- Support civil exploration of deep space
- Comm, PNT, processing nodes
- Maneuver dominated regime leverage multi-mode propulsion

Commercially Provided

## Launch

Commercially Enabled

## Maneuver Without Regret

- Unlock spacecraft from fuel constraints that currently exist
- Maneuver and reposition assets with impunity
- Protect and defend US government, civil and commercial interests
- Enable truly persistent assets and platforms throughout XGEO

Civil Focused

## On-Orbit Assembly and Manufacturing

- Assembly and construction of large structures
- Basis for space based logistics chain
- Enable space commodity exchange
- Tailor structures for environment not launch

## Dynamic Response & Complexity

- Position orbital assets at time and place dictated by dynamic scenarios
- Create uncertainty through complexity

## Rocket Cargo

- Provide support for terrestrial CCMDs
- Provide global hypersonic logistic support

Commercially Provided

## Mid-flight Refueling

- Use fuel required for the mission
- Decrease transit time/Increase revisit rate
- Fly novel flight paths for mission requirements
- Single fuel type multi-mode propulsion
- Decrease launch mass with corresponding cost reduction

## Novel Orbits

- Learn how novel, low-energy orbits can be exploited
- Map the dynamic Earth-Moon LaGrange Points

VLEO - MEO

GEO – 2x GEO

3x GEO – L1/L2

# Assured Access to Space

*The Future of Assured Access to Space*

## 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 |

Orbital/Sub-Orbital Launches; Storage, Surveillance, and Refurbishment of Decommissioned ICBM Motors

**National Federation of Spaceports**

USG and State Spaceports Collaborations

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

**Mission Lifecycle Management**

- SV Processing Management; Building Capacity
- AATS-Level Ops Centers for Monitoring Hardware Movements and Assets

## OPERATIONS

**Spaceports/Launch/Satellite Ops**

SSC/S3

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

AATS AA3/5/3

- AATS Program Incubator
- AATS Policy, Requirements & Funding

**2 USSF RANGES 2 ARMED SERVICES**
**3 TRACKING SITES 9 LOCATIONS**
**100+ MISSION PARTNERS 10K PERSONNEL**


New Effort  Currently Executing

## RAPID DELIVERY

**Sub-Orbital Rapid Strategic Mo**

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

## ORBITAL RESILIENCY

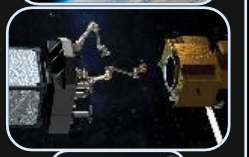
**Tactically Responsive Space**

TacRS
Provide responsive warfighter space capabilities on demand to maintain space superiority through all phases of conflict

**On-Orbit Servicing, Maneuver, & Debris Removal**

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

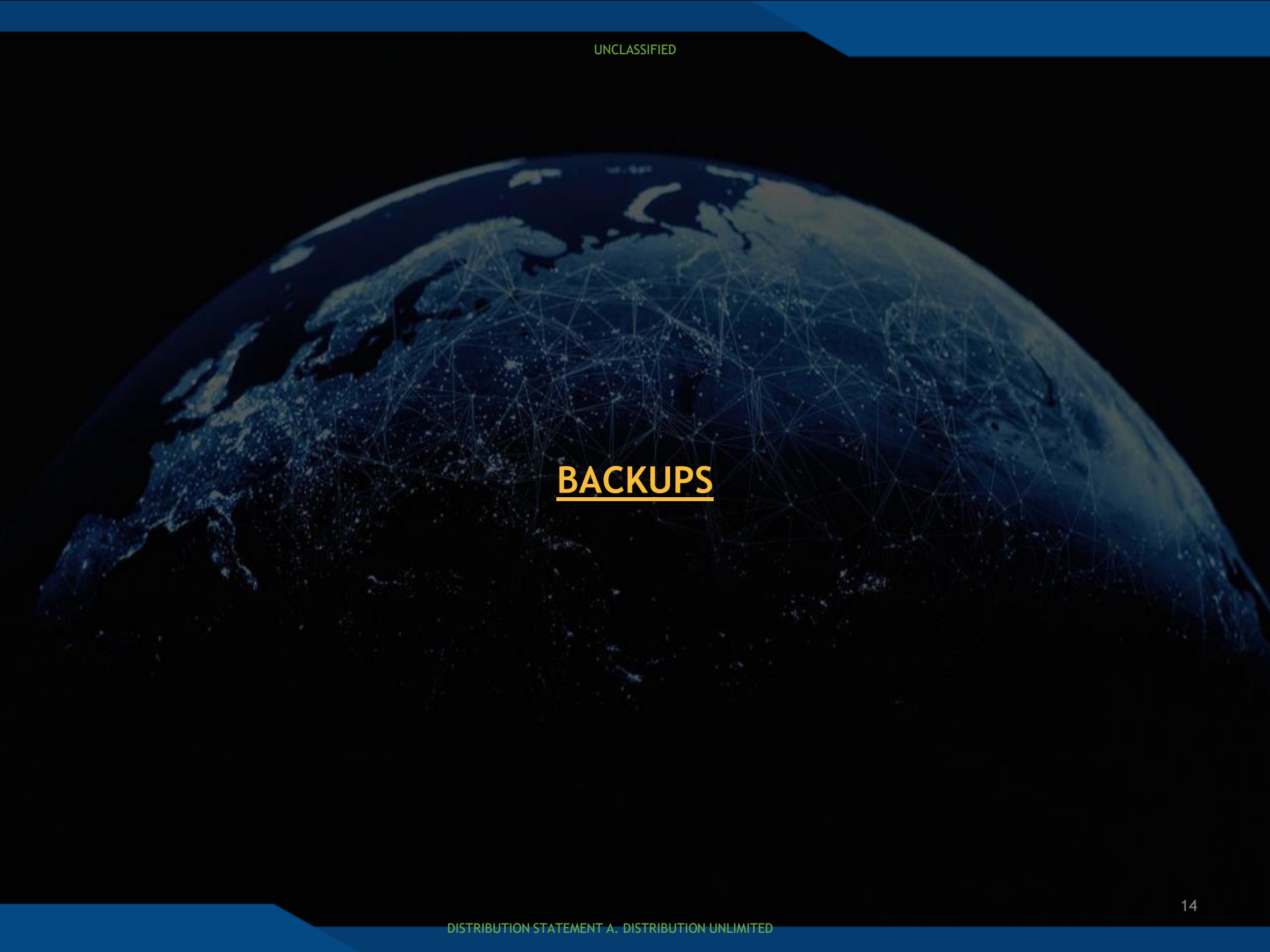
Orbital Maneuver
Leverage commercial industry for on-orbit maneuvers; Small-launch to LEO, use on-orbit stages to higher altitudes



Debris Removal
Engage and Energize Industry Solutions

# Key Takeaways

- Logistics chains critical in ALL warfighting domains…cannot fail mission
- The DoD must develop logisticians that can plan and operate across all domains…including space.
- We need Government experts as well as contractor experts to help develop requirements and CONOPS
- PEO Assured Access to Space is growing capability to acquire, command, and control Department of Defense and commercial space-based logistics services



# BACKUPS

# Spaceport of the Future (SOTF) Lines of Effort

**Architecture** — LTRS R&PC
- Implement comm upgrades
- Provision PaaS & IaaS via RSHP
- Plug-and-play based on use cases
- Transition to DevSecOps delivery

**Infrastructure** — SLD 30/45
- Installation Planning and Roadmaps
- Vehicle and Spacecraft Processing
- Multi-user / maximize launch pads

**Operations / Business Model** — SLD 30/45
- LISC Follow-on
- Consistent ER/WR Processes
- Streamline Governance/Bureaucracy

**Policy / MRTFB** — SSC/S3
- AFSS Transition
- Legislative Proposal
- Policy changes (FMR, DoDI, etc.)

**Spaceports** — SSC/S3
- Interagency Planning Group
- Management Structures


Senior Steering Group
- DS3, SLD CV-Os, Sr Aerospace Advisor
- Monthly meetings, in-person quarterly, decisive vectors for ROTF IPTs, projects and emergent needs

**Operate as a Single, Innovative Enterprise & Address Unique Customer Needs**