NASA
LAUNCH SERVICES OVERVIEW
TO
NASA ADVISORY COUNCIL

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Purpose: Provide an overview of the NASA’s Launch Services Program and the relation to Commercial Resupply Services efforts and the Commercial Crew Program.

**NASA Space Launch Chain of Command**

- **NASA Administrator**
  - Bolden

- **Associate Administrator**
  - Human Exploration and Operations
  - Gerstenmaier

- **Exploration Systems Development Division**
  - Hill

- **Commercial Spaceflight Development Division**
  - McAlister

- **Launch Services Office**
  - Norman

- **International Space Station Division**
  - Scimemi

- **International Space Station Program**
  - Suffredini

- **Cargo Resupply Service (CRS)**
  - Koerner

- **Commercial Crew Program**
  - Lueders

- **Commercial Crew and Cargo Program Office**
  - Lindenmoyer

- **Commercial Orbital Transportation Services (COTS)**
  - *No longer active-program accomplished*

- **Launch Services Program**
  - Mitskevich

- **Space Launch System Program**
  - May

- **Launch Services Program Office**
  - *No longer active-program accomplished*
Launch Services Program Overview

Commercial Acquisition Expertise
- Commercial Space Act of 1998 (est. 1984)
- National Space Policy 2010
- National Space Transportation Policy 2013

One-Off Solar Probe Plus (SPP)
Advisory Services

Formalized Government Collaboration
- Memorandum of Understanding – March 2011
- Government ELV Executive Board, GEEB (Quarterly)
- USAF-NASA-NRO Summit

Program Management, Analysis, Engineering, Integration, & Launch Operations

- **Experience**: technical, stable civilian workforce, 259 civil servants & 180 contractors, 15+ years average in launch
- **Consistency**: 79 full missions + advisory

On Orbit
- Technical Assessment
- Launch Mgmt. w/ “GO” for Launch
- 97+% Mission Success rate

On Time
- Mission Management
- Risk Management

On Cost
- Success in Fixed Price Contract Mgmt.
LSP’s Current and Future Fleet


**NASA is not prohibited from acquiring launch services that use Russian Engines**
LSP Acquisition Strategy

**Federal Acquisition Regulation (FAR)**

**NPR 8705.4** Risk Classification for NASA Payloads
Office of Safety and Mission Assurance

**Low Risk Tolerant Approach**
- NASA Launch Services (NLS) II Contract
- Firm Fixed Price Commercial Launch Services (Best Value)
- Optimal Government Insight/Oversight
- On-ramp provision enables new entrants

**High Risk Tolerant Approach**
- Venture Class Launch Services (VCLS)
- Firm Fixed Price Commercial Launch Services
- Minimal Government Insight
- FAA Licensed Approach

**Tailored Approach**
- Stand Alone Contracting Strategies (e.g. Solar Probe Plus)
- Based on Customer Need

NLS

VCLS
Components of Launch Service Budget

**Fixed-Price Contracts for Commercial Launch Services**
- Basic Launch Service
- Mission Uniques
- Commercial Payload Processing Facility

95%+ of Cost is via Fixed Price Contracting

*Price remains constant regardless of the cost of production (contractor assumes risk)*
- Sets budget early at fixed level
- Total cost for launch vehicle understood @ Award
- Provider incentivized by schedule & success
LSP Requirement Flowdown

NPR 7120.5 NASA Space Flight Program and Project Management

NPR 8705.4 Risk Classification for NASA Payloads

OSMA

NPD 8610.7 Launch Services Risk Mitigation Policy for NASA-Owned and/or NASA-Sponsored Payloads/Missions

NPD 8610.23 Launch Vehicle Technical Oversight Policy

NPD 8610.7 Launch Services Program Pre-Launch Readiness Reviews
Establishes NASA’s role for commercially-provided launch services to ensure the highest practicable probability of launch success

Combines focused approvals & technical insight

Engineering Review Process guides formal multi-discipline engineering evaluations and provides technical recommendations

Business Operating Success Strategies (BOSS) establishes baseline implementation approach for the LSP Mission Life Cycle, including measurable performance indicators

Flight Planning Board (FPB) aggregates mission requirements, assigns missions to launch vehicles, and approves any mission-specific tailoring

Advisory Services provide tailored support for non-traditional missions
Certification Requirement
Flowdown and Implementation

NPR 8705.4
Risk Classification for NASA Payloads
OSMA

NPD 8610.7
Launch Services Risk Mitigation Policy for NASA-Owned and/or NASA-Sponsored Payloads/Missions
(Since 1999)

Certification Strategy adopted by USAF and NRO via “Coordinated Strategy”

“...balance launch risk for individual missions with launch vehicle demonstrated flight history and NASA technical penetration...”

Initial non-reoccurring risk assessment provides a strong foundation for launch vehicle oversight and individual mission CoFR
LSP Launch Readiness

Establishes milestones for LVRR, LRR, FRR, & Final Poll for Launch

Significant results of launch vehicle certification and oversight inform the launch readiness assessment process

Blended Commercial and Government CoFR
In 2008 the Flight Planning Board approved key areas to provide the ISS with the best evaluation of the contractor’s launch vehicle technical risk:

- Guiding principle was the commercial provider, not NASA, will be responsible for the launch success of the service
- Engineering mainly focused on LV design and qualification
- S&MA focused on build processes and insight into the specific vehicle as requested
- The NASA Technical Authorities for CRS missions are at JSC

Test Like You Fly Assessment (non-recurring):

- Launch vehicle systems limited to propulsion, flight controls, and separation
- LSP approach for identified systems equivalent to NPD 8610.7

GN&C simulation and Flight Software Development Practices (non-recurring)

Post Flight Data Review (recurring)

Quality, Reliability, Systems Engineering and Risk Management (recurring)

Technical findings and risks communicated regularly to ISS Program Office since LSP began NLS II technical oversight and certification for Falcon 9

- LSP has not yet purchased an Antares vehicle so additional information is not available
LSP Support to the Commercial Crew Program (CCP)

- LSP has supported CCP Programmatic & Technical tasks related to launch services
  - Firm Fixed Price Contracting and certification process lessons learned
  - Participation in CCtCap SEB
  - Supporting CCP launch vehicle tasks for CCiCap milestone reviews and CPC deliverables

- LSP and CCP have defined LSP support for the certification phase of the Program
  - Certification for CCP is based on compliance to NASA human rating and key ISS Design Reference Mission requirements, not to NPD 8610.7
  - Maximizes LSP’s expertise gained in management of the launch services for NASA’s high value spacecraft
  - Recognizes that Human Spaceflight requirements drive differences in the typical LSP support model
  - Certification approaches have common requirements (e.g. Quality) and types of assessments (e.g. qualification/acceptance)
  - 8 task statements approved for LSP execution in support of CCP certification determination
    - Hardware/Software qualification and vehicle build assessments
Global Impact

Awareness of fleets across the world

Established commercial provider relationships

Leverage Government partnerships

Provide expertise for multiple customers (e.g. CRS and CCP) with common LV issues

Optimize Government oversight to balance risk & mission success

Summary

LSP has established requirements which flow down to robust & demonstrated internal processes and experienced personnel.

Experience with a variety of providers has shaped LSP to be flexible, allowing tailorable implementation for a wide variety of customers.