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LAUNCH SERVICES PROGRAM

NASA
LAUNCH SERVICES PROGRAM

DYNAMIC AO PRE-PROPOSAL CONFERENCE
June 6, 2023

Rex Engelhardt

LSP Flight Projects Office

NASA Launch Services Program Relationships (NASA/HEOMD/KSC)

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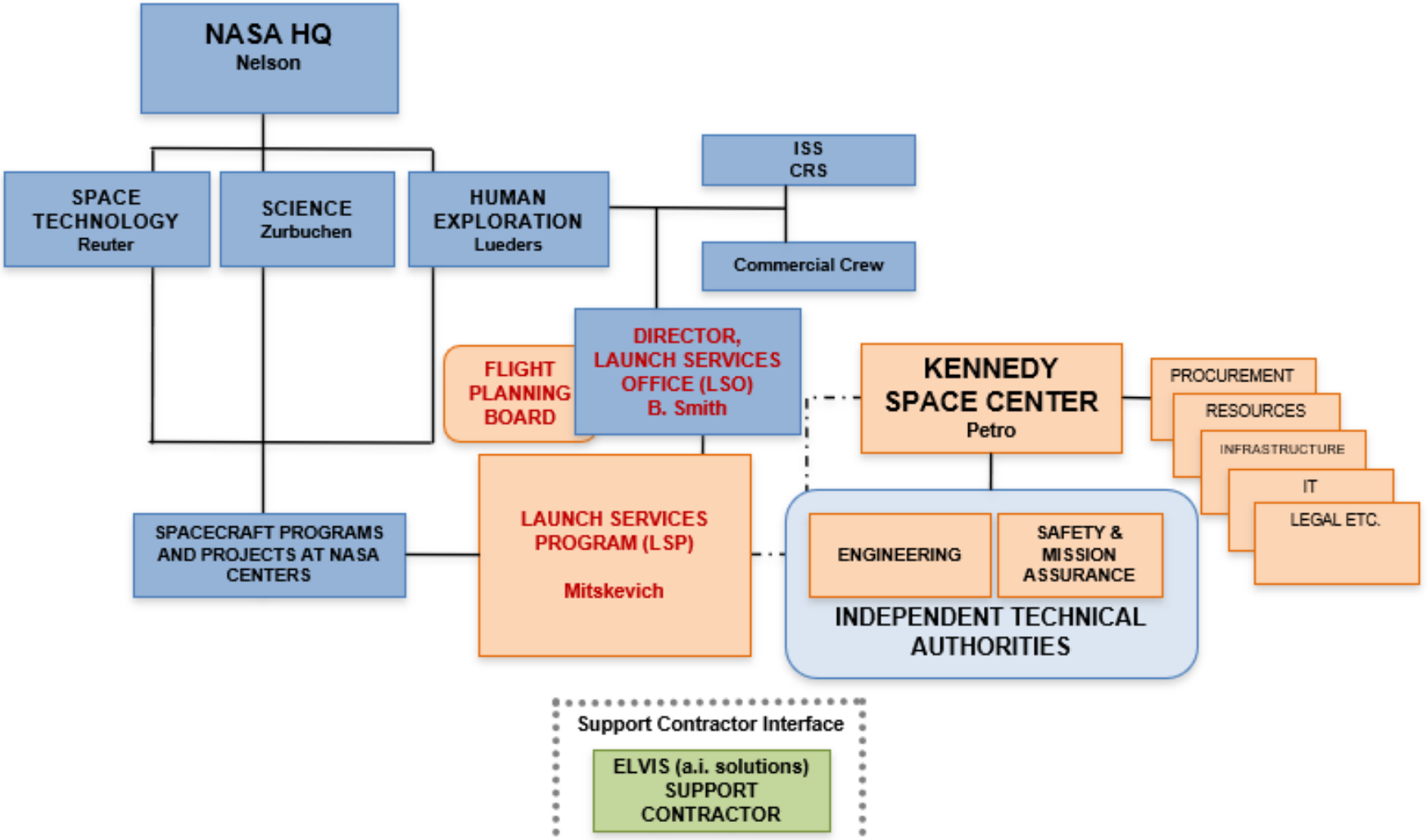

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LSP Organizational Structure

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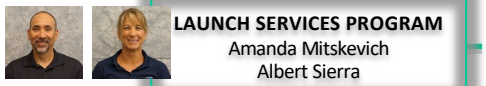

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FLIGHT PROJECTS
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Pre-Phase A–E

NASA LSP Functional Structure

- NASA Launch Services Program (LSP) procures/provides a Launch Service
  - Its more than the basic launch vehicle
  - We don't buy a tail number
  - This is a commercial FFP procurement with additional insight and oversight
- To enable this, LSP has two functional sides
  - Mission integration
    - » Mission Integration Team (MIT) assigned to each mission
    - » Manages mission specific procurement, integration, and analysis
    - » Includes launch site integration and processing
  - Fleet management
    - » Personnel assigned to each contracted rocket
    - » Includes resident offices within the production facilities of all active providers
    - » We watch the production and performance of entire fleet – we certify the manufacture's production line, not just a particular unit (tail number)
    - » We have a say in any change/upgrade/anomaly
- LSP maintains the final go or no-go for launch for NLS-2 procured mission
  - If fly as a secondary payload – will not have a go for launch (although primary will)
  - If fly as a primary under VADR – S/C (not NASA LSP) will have a go for launch
- Interface with Safety and Mission Assurance
  - Safety
  - Quality

Options Available for this AO

There are essentially 2 potential paths to orbit available for the DYNAMIC AO:

- **First off, to be clear, A PI providing their own transportation to orbit is NOT an option under this AO**
- **The first order plan for DYNAMIC's access to space is to be a rideshare with another government mission**
- **The backup to that plan (should there be an issue with the primary plan) would be to ride on a vehicle procured under the Launch Services Program (LSP) Venture-Class Acquisition of Dedicated and Rideshare (VADR) contract**
- **The decision as to how DYNAMIC is delivered to orbit will be made by NASA and is not a choice open to the proposers**

Options available for this AO, Cont.

More details on the 2 paths under consideration for the DYNAMIC AO

- **AO-Provided Rideshare Access to Space (Primary Plan)**
  - Via ESPA Grande (or equivalent adapter) as a secondary payload
  - Up to two ESPA ports may be used. If two RPL(s) are proposed, they do not need to be identical.

- **Launch services provided under new VADR Contract:**
  - **AO-Provided Access to Space (FAA-Licensed Launch Services under VADR)**
  - Domestic launch vehicle certified as category 1 per NPD 8610.7D
  - Modified technical oversight approach per NPD 8610.7D *Launch Services Risk Mitigation Policy for NASA-Owned and/or NASA-Sponsored Payloads/Missions* will be executed for AO for Class D payloads.

Launch Vehicle Performance

The DYNAMIC mission design shall be compatible with a launch vehicle injection anywhere within the following ranges (for either launch option):

- Altitude: 350 – 900km (circular)
- Inclination: Between 80 and 84 degrees

— "This compatibility includes but is not limited to the ability of the mission to reach its final science orbit, conduct its maneuvers, etc"

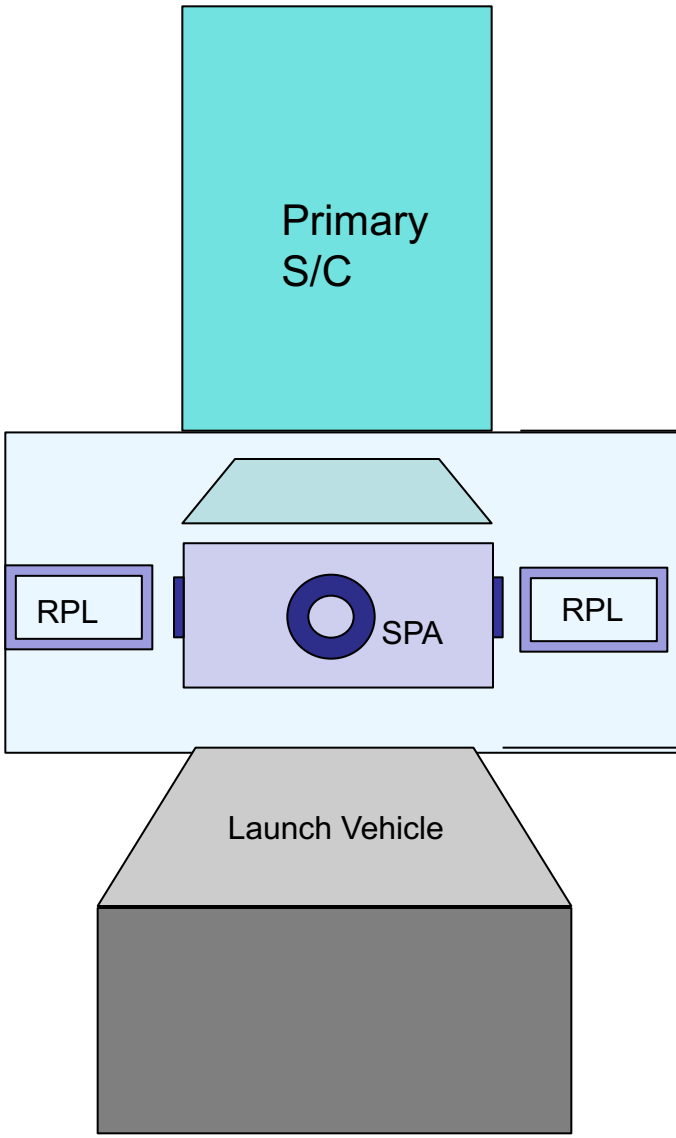
— Section F in the proposal states that the proposal must describe "the delta-v allocated for achieving the mission orbit from any injection orbit within the range specified in the SIS"

—Also see Q&A T-4

AO-Provided Secondary Launch Services

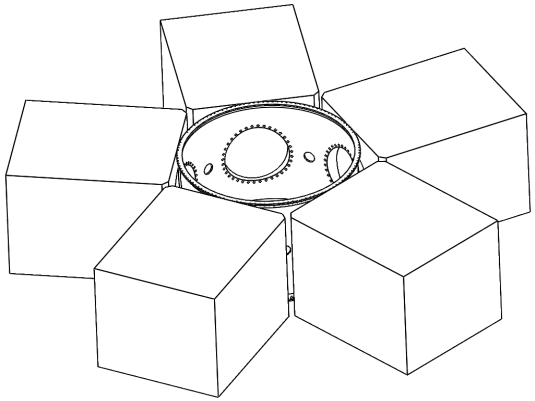
(AO-Provided Rideshare Access to Space LSP Procured)

ESPA Configuration



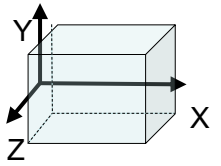
- LSP will procure the launch service for the Primary spacecraft and the ESPA ring through the Launch Service Task Order (LSTO) process
- LSP will coordinate the mission integration process with the Launch Service Contractor, the Primary spacecraft customer, and the RPLs
- The LV provider will be tasked with coordinating the integration process with the RPLs
- There will an ICD between each of the RPL's and the Secondary Payload Adapter (SPA) System
- The SPA and RPLs will be integrated into one assembly and then mated with the Primary Spacecraft
- The Launch Service Contractor is responsible for the build and check out of the launch vehicle with NASA involvement/insight

ESPA type Interfaces



ESPA Grande

ESPA	Max RPL Mass	Allowable RPL Volume	RPL Interface
ESPA Grande 5 Port	465 kg	42”x46”x56” Y, Z, X	24” circular



NASA will provide the Separation System as GFE: Examples: RUAG PAS 610S (24”), PSC MkII MLB (15” or 24”)

RPL Do No Harm

All ESPA class RPL will be subject to a Do-No-Harm (DNH) assessment process to ensure that they will not pose a threat to the mission success of the Primary spacecraft or Launch Vehicle (LV) – Some general DNH considerations include:

- RPL design should follow the NASA RUG guidelines *NASA Science Mission Directorate (SMD) Launch Vehicle Secondary Payload Adapter DYNAMIC System Interface Specification (SIS)* in Program Library
- Include a filled in *Rideshare Accommodations Worksheet Template* containing the data associated with your proposal
- Design must physically comply with the space allotted and remain constrained and sufficiently stiff to not make contact with launch vehicle or other spacecraft hardware during flight
- Dynamic modes of the auxiliary payload must be sufficiently understood and communicated to ensure no detrimental dynamic loading onto the launch vehicle or primary spacecraft (guidance provided in the NASA RUG)
- RPL must maintain integrity and not separate prematurely under worst case predicted loads and environments (acoustic, shock, vibe, thermal, depressurization)

RPL Do No Harm

- Flight Risks associated with guidance in the DYNAMIC System Interface Specification (SIS)
  - Separation analysis must ensure no re-contact with the LV, Primary spacecraft, or other RPLs during RPL separation event(s)
  - RPL separation indications must be included in the LV telemetry stream
  - Mitigations are in place to ensure any potentially hazardous functions are redundantly inhibited until well after the RPL is clear of the LV, Primary spacecraft, or other RPLs
  - RPLs must not generate debris that may contact the LV, Primary spacecraft, or other RPLs
  - RPLs contamination sources must be understood and provided to the LV, Primary spacecraft, or other RPLs for impact assessment
  - RPLs must not generate environments (e.g. thermal, separation shock, etc.) which detrimentally impacts the qualification of the LV, Primary spacecraft, or other RPLs

RPL Do No Harm

- Launch Schedule Support
  - RPL integration schedules must support launch vehicle/primary payload integration schedules
  - RPLs must not impact the launch date for the primary mission in the event that the RPL is not able to support launch date – This is typically accomplished by having a mass simulator available and ready to integrate
  - RPLs must support the full launch window defined by the primary spacecraft

- Personnel Safety
  - RPLs must comply with applicable OSHA, DOT AFSPCMAN 91-710
  - RPLs must be stable and safe without services (power, commodities) once integrated

AO-Provided Primary Launch Services

(Commercial FAA-Licensed Launch Services LSP Procured under VADR)

Commercial FAA-Licensed Launch Services

- **Compatibility with this VADR option is not required but provides programmatic flexibility**
- **Requirement 101 - The proposal shall discuss flexibility to reconfigure the proposed flight system for launch on a dedicated launch vehicle matching the descriptions in the LSPIS document.**
  - **Proposers are to discuss that in their Appendix J.18 to include:**
    - **If applicable, a figure showing how the flight system would be re-configured inside the fairing shown in the LSPIS document. The figure shall include sufficient dimensions to validate fit within this fairing static envelope, including any close approaches.**
    - **If applicable, a depiction of payload adapter(s) that would be used in order to combine the elements from two ESPA Grande ports, into a single fairing.**
    - **A discussion of any other challenges and concerns associated with adapting the baseline rideshare design to a dedicated launch. This discussion can consider technical accommodation (interfaces, environments, assembly, launch processing, etc.) as well as project schedule.**
- **Domestic launch vehicle on its first flight will be permitted; however, prior to launch the vehicle will be certified as Category 1 per NPD 8610.7D, *Launch Services Risk Mitigation Policy for NASA-Owned or NASA-Sponsored Payloads/Missions* (see AO Library).**
- **A modified technical oversight approach per NPD 8610.7D Launch Services Risk Mitigation Policy for NASA-Owned and/or NASA-Sponsored Payloads/Missions will be used for Class D missions.**

Static Fairing Envelope (mm)

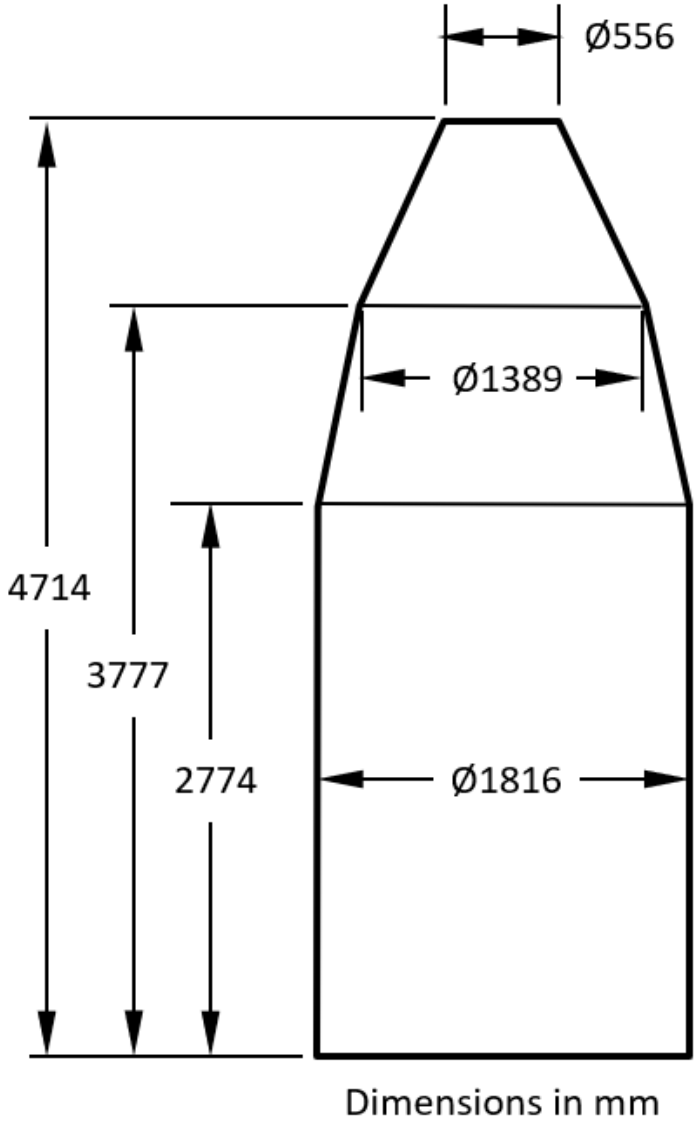


Figure has been reduced by 1.5” (38.1 mm) vertically to account for a typical payload isolation system. If the Spacecraft is providing its own isolation system, 1.5 inches (38.1 mm) may be added to overall height shown.

Summary

- **It is the NASA Launch Service Program's goal to ensure the highest practicable probability of mission success while managing the launch service technical capabilities, budget and schedule.**

- **Questions must be officially submitted to:**

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NASA LSP is ready to respond to your mission specific questions.