



JOHN F. KENNEDY SPACE CENTER



NASA LAUNCH SERVICES PROGRAM

INTERSTELLAR MAPPING AND ACCELERATION
PROBE (IMAP) 2017
PRE-PROPOSAL CONFERENCE
AUGUST 25, 2017

Jim Hall
Flight Projects Office



Options available for this AO

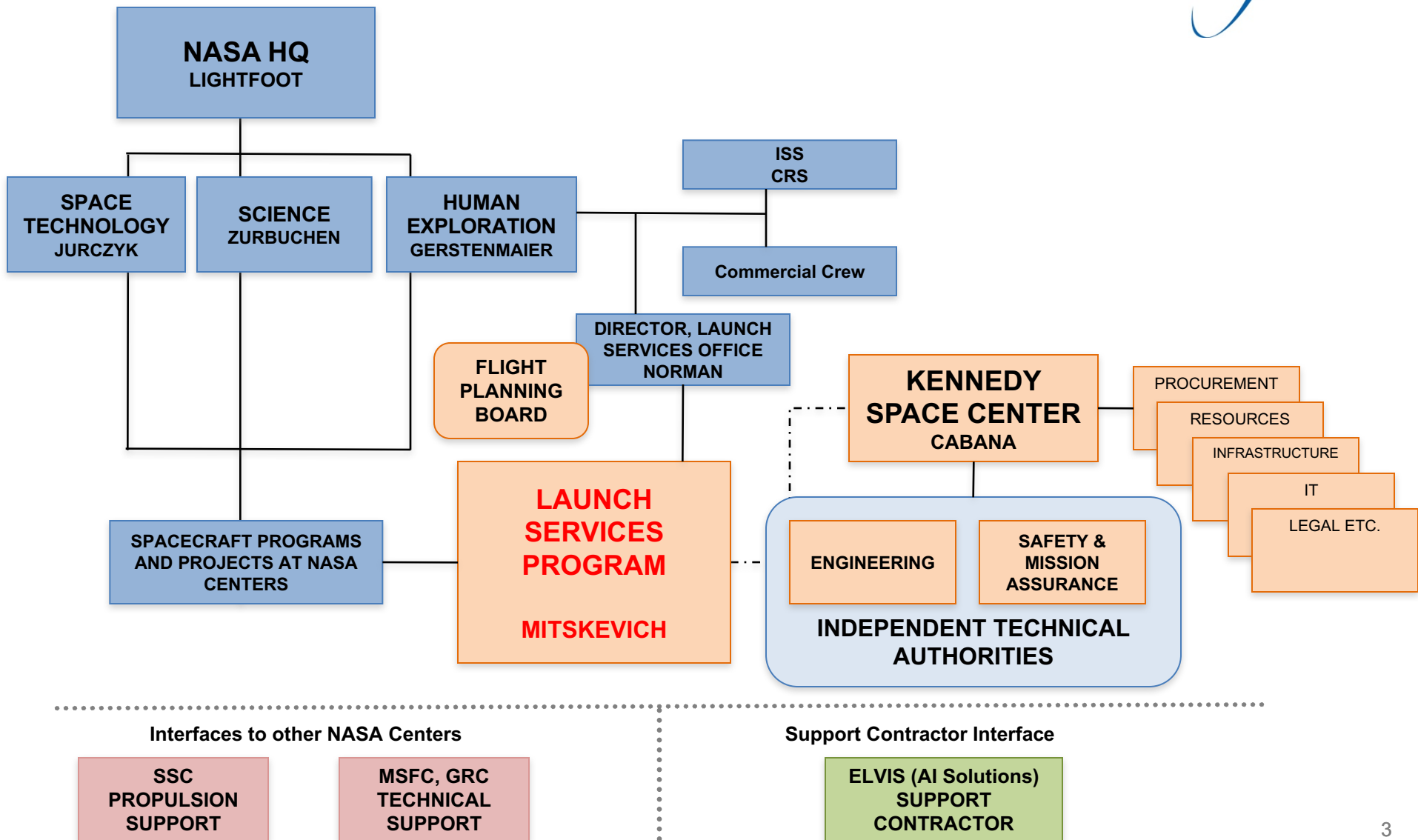


- **Several options are available to proposers for this STP-5 Interstellar Mapping and Acceleration Probe (IMAP) AO**
 - **NASA-provided standard launch services utilizing a domestic launch vehicle certified as category 2 or 3 will be provided**
 - **Any launch service beyond the standard launch service offered must be funded out of the PI-Managed Mission Cost**
 - **Standard launch service provides the performance and volume of an intermediate class launch vehicle**
 - **Contributed launch services cannot be proposed or considered under this AO**
 - **Co-manifested or secondary payloads on a U.S. or non-U.S. launch vehicle may not be proposed or considered under this AO, unless they are proposed in conjunction with the PI-proposed primary payload**
 - **Launch delay costs as a result of spacecraft or payload delays must be funded out of the PI-Managed Mission Cost**



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Launch Services Program Relationships (NASA/HEOMD/KSC)





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Launch Services Program



The Launch Services Program provides

- **Management of the launch service**
- **Technical oversight of the launch vehicle production/test**
- **Coordination and approval of mission-specific integration activities**
- **Mission unique launch vehicle hardware/software development**
- **Payload-processing accommodations**
- **Launch campaign/countdown management**



Launch Services Program



NASA Strategic Plan 2014

Strategic Goal 3:

Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure.



Objective 3.2:

Ensure the availability and continued advancement of strategic, technical, and programmatic capabilities to sustain NASA's Mission



Key Strategy:

Provide access to space

Lead Office: **HEOMD**

Contributing Program: **LSP**

Key Strategy "Provide access to space" citation:

"...certify and procure domestic commercial space transportation services for the launch of robotic science, communication, weather, and other civil sector missions"

"...provide robust, reliable, commercial and cost-effective launch services"

"...assured access to space through a competitive 'mixed Fleet' approach utilizing the breadth of U.S. industry's capabilities"



LSP Strategic Goals 2014

Goal 1: Maximize Mission Success

Goal 2: Assure Long-Term Launch Services

Goal 3: Promote Evolution of a U.S. Commercial Space Launch Market

Goal 4: Continually Enhance LSP's Core Capabilities





LSP Functional Structure



- **LSP procures/provides the Launch Service**
 - Its more than the basic launch vehicle
 - We don't buy a tail number
 - This is a commercial Firm Fixed Price (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**
- **Interface with Independent Technical Authorities**
 - Engineering
 - Safety and Mission Assurance



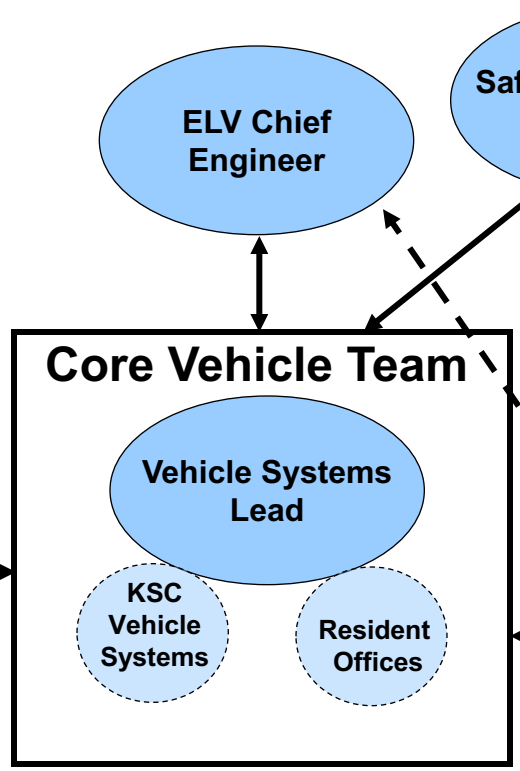
Technical Information flow into the MIT



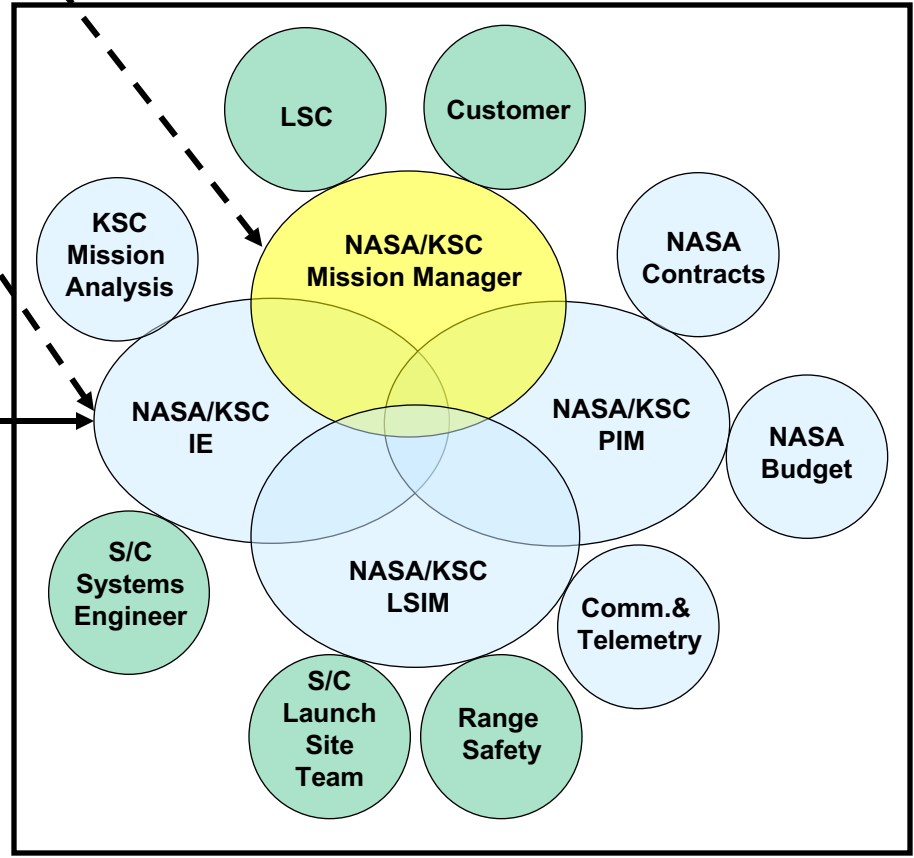
Core Vehicle Test & Build

Integration & Test Facilities

Integrated Product Teams



Mission Integration





NASA Provided Launch Services



- **The NLS II Contract is LSP's primary method to acquire all classes of Category 2 and Category 3 commercial launch services for spacecraft customers**
- **Provides NASA with domestic launch services that are safe, successful, reliable, and affordable**
- **Provides services for both NASA-Owned and NASA-Sponsored payloads through multiple Indefinite Delivery Indefinite Quantity (IDIQ) Launch Service Task Order (LSTO) contracts with negotiated Not To Exceed (NTE) Prices**
- **Provides services on a Firm-Fixed-Price (FFP) basis**
 - **Incorporates best commercial practices to the maximum extent practical**
 - **Includes Standard and Non-Standard services**
 - **Mission unique modifications**
 - **Special studies**
- **Allows LSP to turn on a Task Assignment or Non-Standard Service at any time for analyses**



NLS II Contracts Overview



- **Launch Services Risk Mitigation Policy for NASA-owned and/or NASA-sponsored Payloads/Missions can be found under NPD 8610.7. Document can be found at <http://nodis3.gsfc.nasa.gov>**
 - Risk Category 1: Low complexity and/or low cost payloads-Classified as Class D payloads pursuant to NPR 8705.4
 - Risk Category 2: Moderate complexity and/or moderate cost payloads-Classified as Class C payloads and, in some cases, Class B payloads, pursuant to NPR 8705.4
 - Risk Category 3: Complex and/or high cost payloads-Classified as Class A payloads and, in some cases, Class B payloads, pursuant to NPR 8705.4
- **NLS II Launch Service Costs**
 - Acquisition process begins at approximately L-36 months
 - Authority to Proceed (ATP) concurrent with Task Order Award at approximately L-30 months
 - Costs not covered by the Heliophysics Program include
 - » Spacecraft or Payload caused Launch delay costs
 - » Some mission unique services such as a custom payload adapters, auxiliary propulsion, extreme cleanliness or contamination sensitivities



NLS II Contracts Overview – Cont'd



- **Each Provider has their own unique Launch Delay Table**
 - Delay terms are identical for both parties (Contractor/NASA)
 - **No-fault Launch delays**
 - » Include: range constraints, floods, acts of God, strikes and other conditions
 - » No adjustment made to mission price
 - » No limit on number of days
- **For the remaining delay cases grace days are based on sliding scale for both Contractor and NASA delays**
 - 150 days of grace at ATP through L-24
 - Sliding down to 7 days of grace at L-10 days



Launch Service Budget



- **Under a NASA-provided Launch Service a standard launch service includes:**
 - **The launch vehicle, engineering, analysis, and minimum performance standards and services provided by the contract.**
 - **Mission integration**
 - **Launch Site Payload Processing**
 - **Range Support**
 - **Down Range Telemetry support (launch vehicle only)**
 - **Standard Mission Uniques – these are items typically necessary to customize the basic vehicle hardware to meet spacecraft driven requirements. Already budgeted for are items like Pre-ATP studies such as coupled loads and/or trajectories analysis, payload isolation system, a GN2 or pure air purge prior to T-0 and 10,000 Class integration environment.**
 - **Potential additional funding needed to support selectees requiring launch from sites other than the LV base launch complex**
- **Budget does not include launch delays**

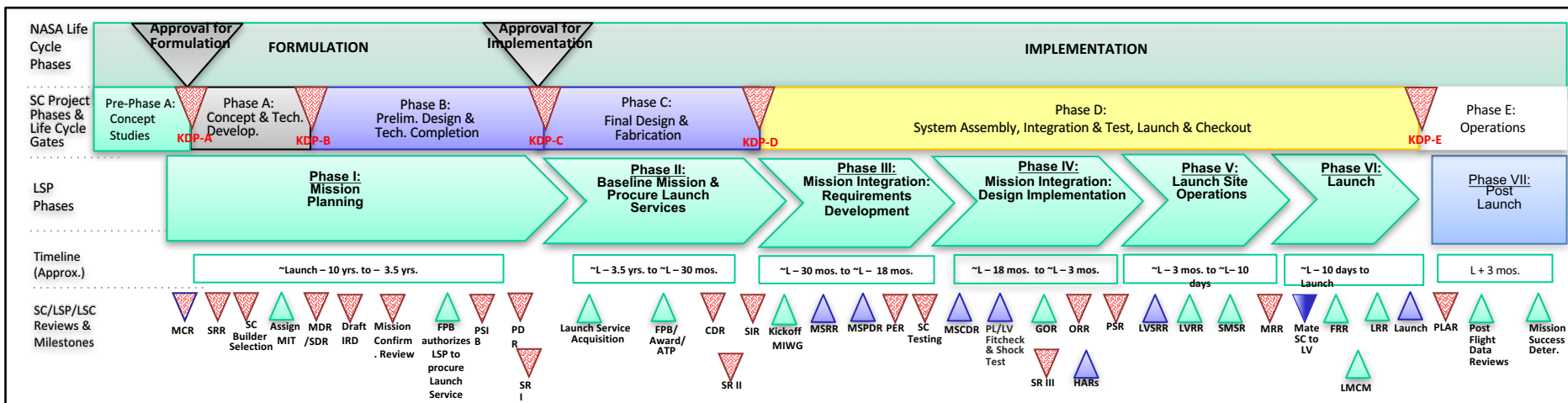


Launch Vehicle Acquisition

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- The acquisition of a NASA-provided domestic expendable launch vehicle proposed for this AO will be procured and managed by the NASA/Launch Services Program (LSP) via the NASA Launch Services II (NLS II) contract.
- The LSP will competitively select a launch service provider for these missions based on customer requirements and NASA Flight Planning Board (FPB) approval.



Printed documents may be out of date; please validate with the LSP Flight Projects Office (FPO) prior to use.

Spacecraft reviews shown in red.



Available Vehicles Under NLS II



- **Performance with reference orbits, Environments, and Fairing Dimensions for candidate launch vehicles for this IMAP AO available on the NLS II contract are listed in the ELV Launch Services Program Information Summary document in the Program library**
- **Assumption of a specific launch vehicle configuration as part of the AO proposal will not guarantee that the proposed LV configuration will be selected**
- **Proposers are advised to plan for compatibility with all medium/intermediate class vehicles that are expected to be available through spacecraft Preliminary Design Review.**
 - **Payload design should accommodate the limiting/enveloping launch characteristics and capabilities included in “ELV Launch Services Program Information Summary” document**

For mission specific information, utilize the LSP performance website and/or the LSP POC.

<https://elvperf.ksc.nasa.gov/>

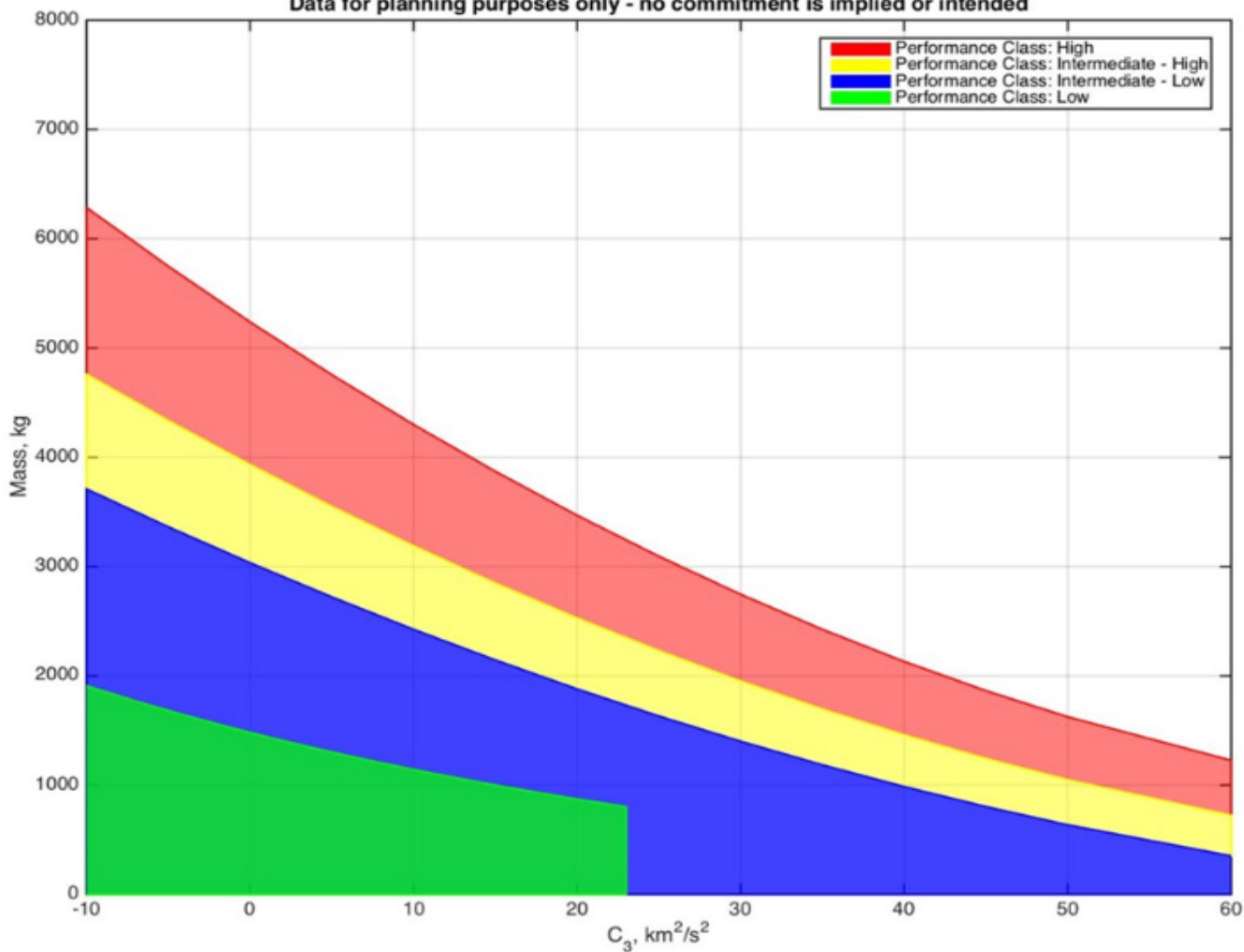


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4m Performance Curves for High Energy Missions

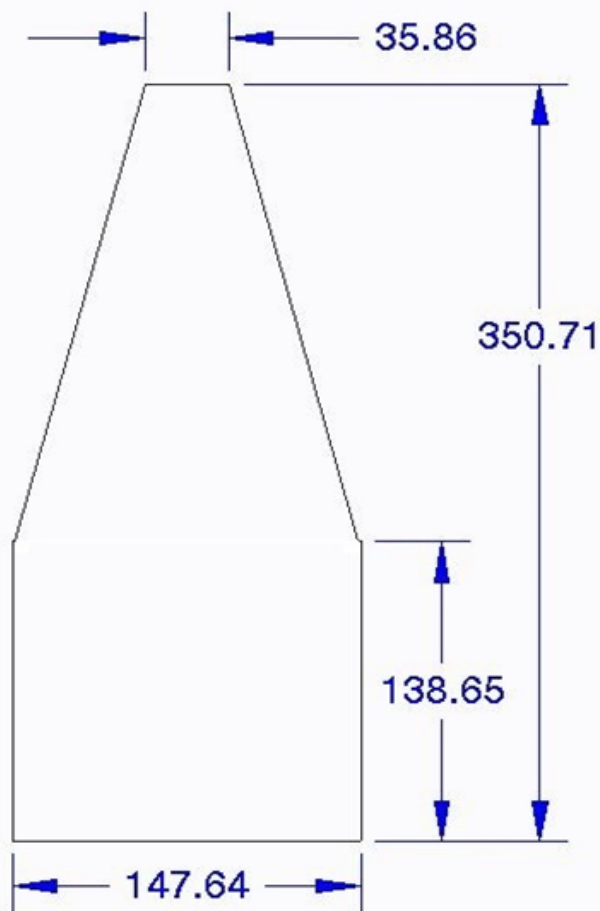
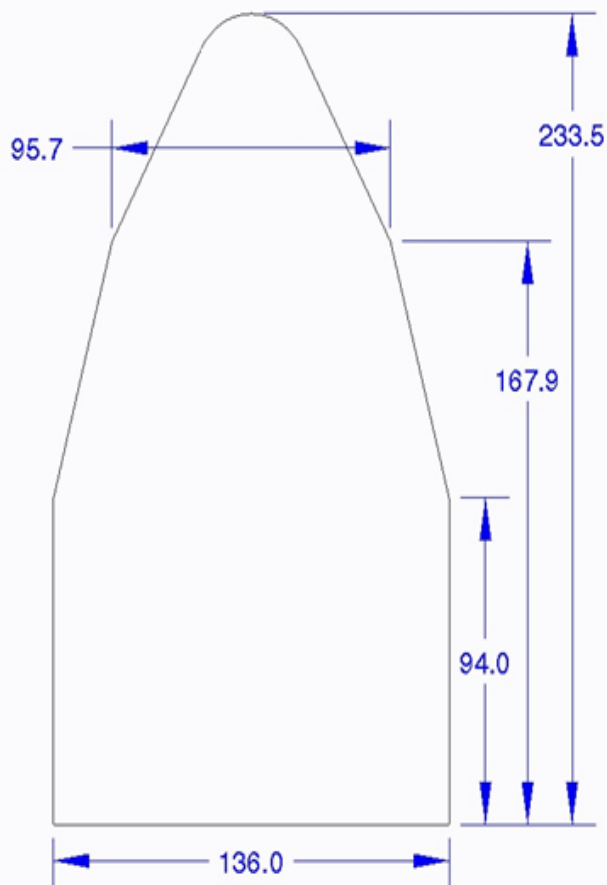


Representative Performance for High Energy Missions: 4-m Fairing
Data for planning purposes only - no commitment is implied or intended





Static Payload Fairing Envelopes



* Depending on the orbit required, different payload fairing volumes are allowed under the standard launch service.

* Proposals should include sufficient S/C dimensions to fit within these PLF static envelopes, including any close approaches.

* Note: For investigations that require a 5m fairing please contact LSP.

**4m Static Payload Fairing Envelope
(Low Performance Class)**

**4m Static Payload Fairing Envelope (Intermediate-Low,
Intermediate-High and High Performance Class)**



Launch Vehicle Enveloping Environments



- **Details regarding launch vehicle environments are found in the ELV Launch Services Program Information Summary (In Program Library)**
 - **Equivalent Sine**
 - **Payload Acoustics**
 - **Shock**
 - **Design Load Factors**
 - » **The maximum positive axial CG Load Factor (compression) is a function of the spacecraft mass. For estimates, please contact LSP and provide the lower estimate for the spacecraft mass (more conservative) in order to supply the applicable CG Load Factors.**



Summary



- It is the 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:

Jim Hall
Mission Manager
NASA Launch Services Program Code VA-C
Kennedy Space Center, FL 32899
Phone: 321-867-6218
Email: James.L.Hall@nasa.gov

LSP is ready to respond to your mission specific questions.



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Back Up



Evaluation



• Launch Service Technical Evaluation:

– **Overall Assessment:** - Given the ground rules in the AO, is the proposed launch vehicle (LV) concept feasible for this application? (Yes or No)

– **Comments:** _____

• LV Performance: Area of concern (Yes or No)

– **Proposed LV configuration:** _____

– **Proposed Launch Date:** _____

– **Launch Period (MM/DD/YYYY to MM/DD/YYYY):** ____/____/____ to ____/____/____

– **Launch Window (On any given day of the launch period Minutes:Seconds):** _____ : _____ .



Evaluation



• LV Performance: Area of concern (cont)

- Orbit requirements: Apogee: _____ km Perigee: _____ km
Inclination: _____ deg.
- High Energy requirements: C_3 : _____ km^2/sec^2 DLA: _____ deg RLA: _____ deg
- Proposed LV Performance: _____
- Mass (including reserves) Dry Mass: _____ kg Wet Mass: _____ kg
- Dry Mass Margin: _____ kg _____ %
- Wet Mass Margin _____ kg _____ %
- Formulas:
 - Mass Margin kg = LV Performance – S/C Mass (including reserves)
 - Mass Margin % = [(Mass Margin kg) S/C Mass (including reserves)kg] X 100
- LV Performance Comments/issues/concerns:



Evaluation



- **Launch Service Cost Assessment: Area of concern (Yes or No)**
 - Is there additional funding for any mission unique modifications/services? (Yes or No)
- **LV Integration: Area of concern (Yes or No)**
 - Does the proposer have experience in LV integration? (Yes or No)
- **LV to Spacecraft Interface: Area of concern (Yes or No)**
 - Proposed Payload Fairing (PLF) _____
 - Spacecraft (S/C) Dimensions: Radial: _____ m Height _____ m
 - Any intrusions outside of the PLF usable Static volume? (Yes or No)
 - **Mechanical Interface:**
 - Standard Adapter: _____ Custom Adaptor: _____
 - **Electrical Interface:**
 - Standard _____ Pin(s) Connector(s): (Yes or No)



Evaluation



- **LV to Spacecraft Interface: Area of concern (Yes or No)**
- **Mission Unique requirements:**
 - Instrument T-0 GN2 Purge: (Yes or No)
 - T-0 S/C Battery Cooling: (Yes or No)
 - Planetary Protection Requirements: (Yes or No)
 - Multiple Spacecraft Deployment: (Yes or No)
 - Telemetry Requirement thru Launch: (Yes or No)
 - Contamination Control Requirements: PLF: (Yes or No) LV adapter: (Yes or No)
 - Cleanliness Level: _____ other: _____
 - **Unique Facility Requirements: (Yes or No)**
 - » Pad: _____
 - » S/C Processing Facility: _____
 - **S/C Environmental Test Plans**
 - » Environmental Test Plan/Flow described: (Yes or No)
 - » Test Levels provided: (Yes or No)
 - » Test Schedule provided: (Yes or No)
 - » Comments/issues/concerns: _____



Evaluation



- **Spacecraft Schedule: Area of concern (Yes or No)**
 - Adequate timing of: Launch Service Integration Start Time: (Yes or No)
 - S/C Environmental Test Program: (Yes or No)
 - Delivery of Verified S/C Model @ L-9 months: (Yes or No)
 - S/C ship date: (Yes or No)
 - S/C to LV integrated Operations: (Yes or No)
- **Missions with Radiological material Area of concern (Yes or No)**
 - List the Radiological Sources:

 - Are unique facilities required to store/process the Radiological Sources? (Yes or No)
 - Any LV modifications required for additional safety or Launch approval? (Yes or No)