

Private Astronaut Mission Pre-Proposal Conference

September 2022



COMMERCIAL LEO
DEVELOPMENT
PROGRAM



Agenda

Welcome/Logistics

Kelly Rubio

Introduction

Angela Hart

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Rebekah Anchondo

PAM NRA Announcement

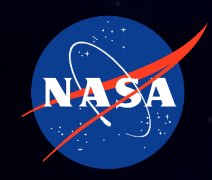
Leticia Vega, Ph.D.

Evaluation Process & Schedule

Leticia Vega, Ph.D.

Q&A





Angela Hart

Program Manager,
Commercial LEO
Development Program
Selecting Official



Kelly Rubio

Contracting Officer,
Procurement Office



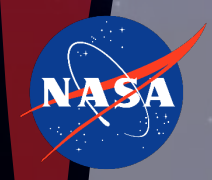
Rebekah Anchondo

International Space Station
Program



Leticia Vega, Ph.D

Commercial LEO
Development Program



Welcome

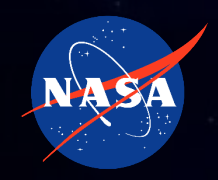
Pre-Proposal Conference Briefing

Kelly Rubio, Contracting Officer

Procurement Office

NASA JSC

To ask questions, please use the MS Teams chat box



Pre-proposal Conference Logistics & Responses to Questions



- A copy of this presentation has been posted at:
<https://www.nasa.gov/jsc/procurement/pamsiss>
- Questions will be answered during this pre-proposer's conference.
- Verbal responses to questions will not be considered official.
- Questions submitted via MS Teams Q&A or email will be answered verbally and in writing.
 - Answers posted to <https://www.nasa.gov/jsc/procurement/pamsiss> and via sam.gov will be considered official responses.
- If a difference exists between verbal and written responses to questions, the written responses shall govern.

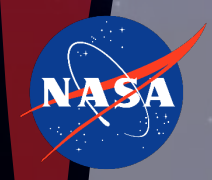


Goals of Today's Pre-Proposal Conference

- Inform industry about the Announcement for two new Private Astronaut Mission (PAM) Opportunities
- Answer questions about the Announcement
- The Government will respond officially to all questions submitted by posting them to the PAM website <https://www.nasa.gov/jsc/procurement/pamsiss> and via [sam.gov](https://www.sam.gov) websites.

Disclaimer:

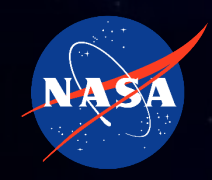
- *These slides are for information and planning purposes only.*
- *This presentation shall not be construed as a commitment by the Government or as a comprehensive description of any future requirements.*



Introduction

Angela Hart, Program Manager
Commercial LEO Development Program

To ask questions, please use the MS Teams chat box



Background



- A private astronaut mission (PAM) is a commercially funded mission that uses a certified U.S. transportation vehicle to ferry a crew complement of Private Astronauts (PAs) to the International Space Station (ISS) for a short duration in order to utilize ISS assets for research and commercialization objectives
- Enabling PAMs to the International Space Station (ISS) is part of NASA's strategy to develop a robust low-Earth orbit (LEO) economy.
- As a part of that effort, NASA modified the existing ISS NASA Research Announcement (NRA) NNJ13ZBG001N to enable PAMs under a specific Focus Area (FA), Focus Area 4.

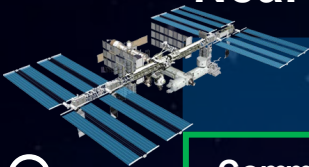


Commercial LEO Roadmap

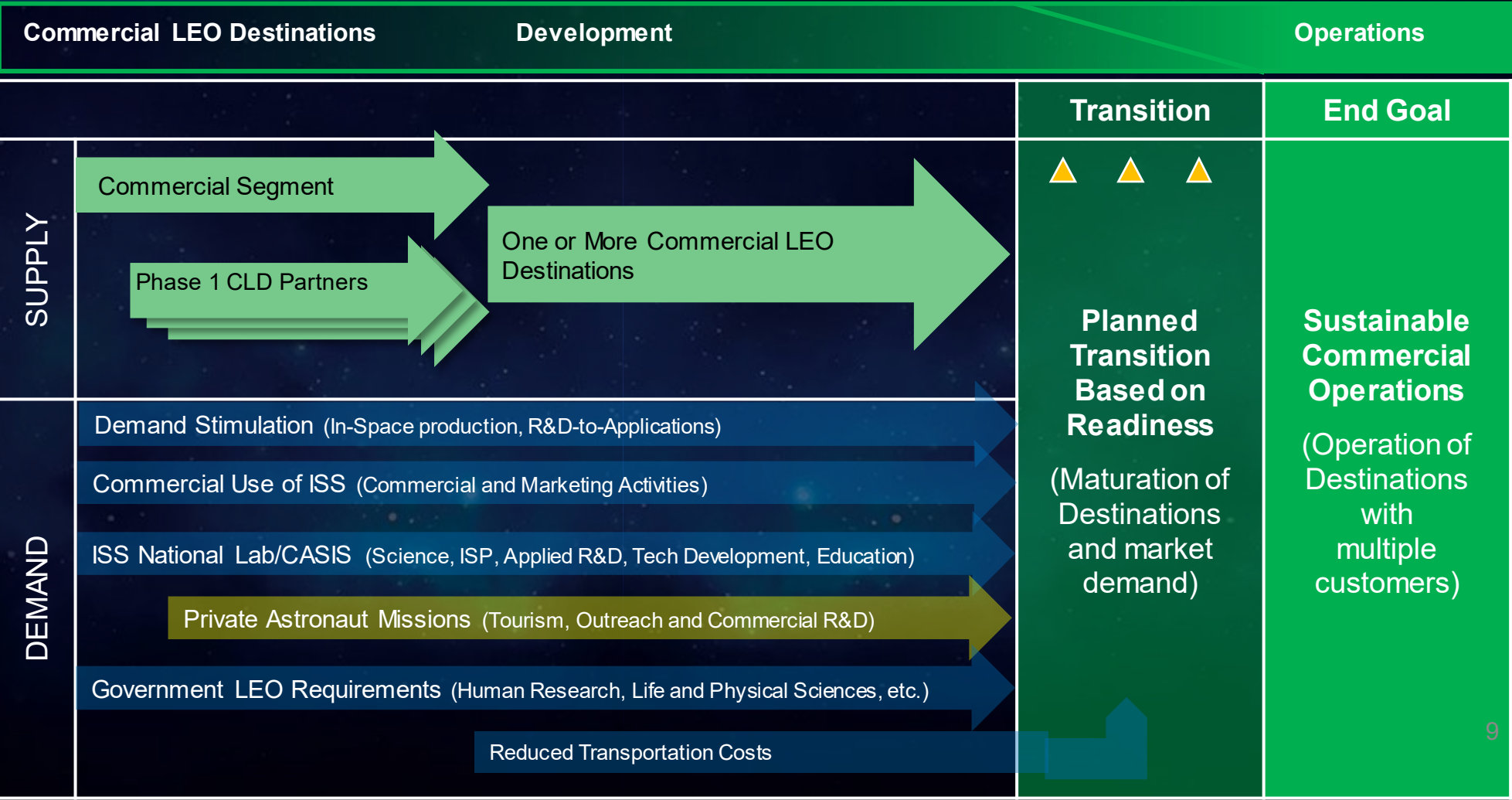
Near-Term

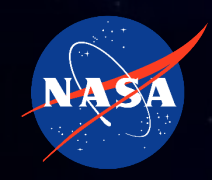
Mid-Term

Far-Term



International Space Station (ISS) Operations

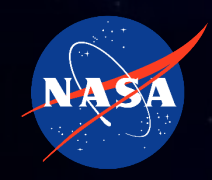




PAM Framework



- In addition to the NRA, Comm LEO and ISSP have developed a broad framework for PAMs
- Framework and PAM requirements are intended to enable PAMs while minimizing impact to NASA resources
- PAM Provider requirements and responsibility:
 - PAM Crew safety for all phases of the mission with liability flow down to USCV and crew
 - Acquiring USCV transportation and ensuring ISS requirement/verification are met
 - Meeting all applicable local, national, and international laws and regulations
 - Providing supplies and resources independently or via NASA per pricing policy
 - Providing real-time mission execution support with key positions
 - Selection, training, and medical qualification of private astronauts to meet NASA requirements.
- The overall PAM philosophy is to balance requirements levied on provider to protect ISS vehicle and crew while allowing provider to manage PAM unique risks
- Approach also delineates government versus commercial responsibility/liability

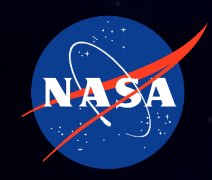


Private Missions Are Thriving

- Opening LEO to commercialization has encouraged efforts to the ISS and to earth orbit in general.
- In under seven (7) months between 2021 and 2022, **four** missions to LEO were successfully completed and **two** additional missions have been announced between late 2022 and the first half of 2023.

Completed Orbital Space Missions Including Private Astronauts 2021-2022			
Mission	Spacecraft	Destination	Mission Date
Inspiration 4	Crew Dragon	Earth Orbit	Sept 2021
Soyuz MS-19	Soyuz	ISS	Oct 2021
Soyuz MS-20	Soyuz	ISS	Dec 2021
Ax-1	Crew Dragon	ISS	April 2022
Upcoming Orbital Space Missions			
Polaris Dawn	Crew Dragon	High Earth Orbit	Late 2022
Ax-2	Crew Dragon	ISS	2 nd Q 2023

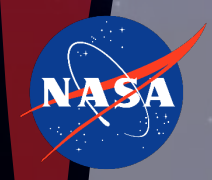
- Ax-1 was the first private astronaut mission under this new framework and NASA is offering two additional opportunities to the ISS in this announcement of opportunity (AO).



Commercial Framework Evolution



- As NASA continues to develop these public-private partnerships and as the number of private missions grow, we expect we will continue to learn and modify our approach. This continuous improvement process will benefit future PAMs and the development of commercial destination(s) with government and non-government objectives
- Based on lessons learned from previous spaceflight participant missions and the first PAM (Ax-1), NASA has updated our requirements since the last solicitation. Some of the key updates since the last solicitation include:
 - Clarification to existing requirements
 - Additional experience requirements for PAM Commander
 - Updates to visiting vehicle integrated operations for safety
 - Updates to mission timeline development to increase PAM mission success and reduce impacts to ISS operations

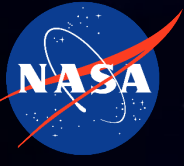


PAM Overview

Rebekah Anchondo

International Space Station Program

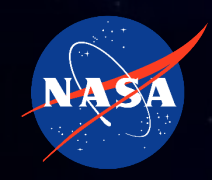
To ask questions, please use the MS Teams chat box



Private Astronaut Missions (PAM)

- The PAM must:
 - Use U.S. transportation vehicles that meet NASA's ISS visiting vehicle requirements
 - Carry a crew of no more than four (4) crew for a planned ISS docked duration of no more than fourteen (14) days.
- Scheduling of the missions will be based on overall flight opportunities, ISS vehicle traffic, operations scheduling constraints, and integration timeline considerations.
- Where commercially available at a reasonable price, the PAM Provider should seek direct business-to-business arrangements for required services
- PAMs cannot replace or supplement CCP contracts to acquire transportation services for NASA crews. PAMs are used for the purpose of flying Private Astronauts to the ISS.

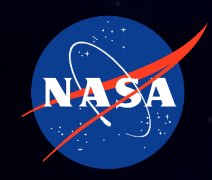
- The PAM Provider is responsible for selection and medical certification of PAs
 - NASA will review certification packages to assess if there are acceptable levels of risk to the NASA/IP mission and crews
- Prior to the mission, the PAM provider is responsible for
 - Development of pre-flight Health Stabilization Plan to protect the health of the ISS crew
 - Planning of the pre-flight quarantine of crew
- The PAM provider is responsible for providing medical care for PAs during all phases of flight:
 - Provide medical personnel with requisite experience to support the PAM crew and activities
 - Provide medical kits containing routine medications, crew specific maintenance medications, and associated hardware for the duration of the mission
 - Train at least one PA as a Crew Medical Officer (CMO) who, together with the PAM CS, is responsible for the routine medical care to maintain PA health throughout the mission
- NASA medical assistance (Surgeon, ISS CMO, BMEs) and equipment may be called upon to support a contingency medical situation



Crew Training



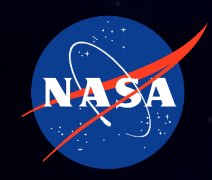
- Training of Private Astronauts is expected to take up to 12 months and includes training at Johnson Space Center, Marshall Spaceflight Center, International Partner facilities, and USCV transportation provider facilities.
 - The PAM Provider is required to procure training services from the appropriate NASA training vendor partners, International Partner training vendor partners, and PAM USCV provider.
 - Use of NASA facilities for training is enabled via a Reimbursable Space Act Agreement (RSAA) between NASA and the PAM Provider
 - Use of MCC and KSC Crew Quarters (suit room/quarantine) can also be requested via the RSAA
- The PAM Provider is responsible for training of PAs to meet NASA certification standards as defined by the Flight Operations Directorate (FOD)
 - All PAs must be trained to a Minimum required (M) level to ensure the safety of themselves, other ISS astronauts, and the ISS vehicle.
 - At least two (2) PAs must be trained to a Minimum Escort (ME) level which reduces the impact to ongoing ISS operations and improves overall mission safety and private crew autonomy.



PAM Transportation



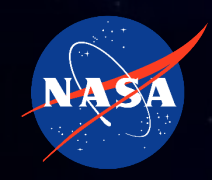
- The PAM Provider maintains responsibility for launch vehicle safety and mission success
- The PAM Provider must utilize a certified PAM USCV, which is defined as a previously flown crewed visiting vehicle to the ISS that satisfies the following certifications:
 - Completed requirement verification for ISS interface and safety per SSP 51087 PACE Annex 1 (including applicable SSP 50808 and CCT-REQ-1130[i] requirements).
 - Completed requirement verification for capability to dock to ISS Node 2 Forward and Node 2 Zenith. This is necessary to support ISS flight planning.
 - Completed NASA Docking System (NDS) multi-mission certification, if applicable. that verifies capability of the NDS (e.g., qualified service life) to support for all NASA CCP obligations in addition to any other proposed uses (e.g., PAMs).



Real-Time Operations

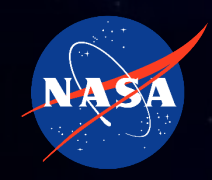


- The PAM Provider supports real-time mission operations with trained and certified ground control personnel, including USCV Provider support
- The NASA ISS Flight Director maintains overall authority for on-orbit integrated operations
- The PAM Provider will support the existing ISS real-time planning process to enable integration of PAM requirements into the timeline



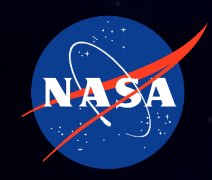
ISS Services and Resources

- ISS resources available to PAMs are divided in three categories:
 - Mandatory: Required services supplied by NASA
 - ISS Emergency Hardware, Basic NASA IT, ISS Expedition crew time for VV operations/ISS familiarization, ISS Voice Data
 - Mission Essential: Shall be supplied by either NASA or PAM Provider and meet NASA standards/requirements
 - Ground facilities, quarantine, Food, Essential Crew Provisions
 - Optional: Not required, but may be negotiated with NASA
 - Use of ISS Cameras, IVA tools, Use of on-orbit facilities
- PAM Providers are responsible for reimbursing NASA for NASA services rendered based on NASA's [Commercial and Marketing Pricing Policy](#)



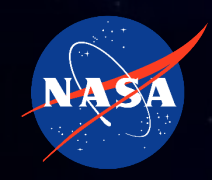
Mission Integration Considerations

- Integrating a PAM requires significant collaboration between the PAM Provider and NASA.
- NASA has implemented requirement changes to improve efficiency of mission integration and execution of Private Astronaut Missions.
- The following slides will highlight a few key integration areas:
 1. PAM Commander Experience
 2. Research Integration
 3. Visiting Vehicle Proximity Operations
 4. Mission Timeline Development and Execution
 5. Communications and Outreach



PAM Commander Experience

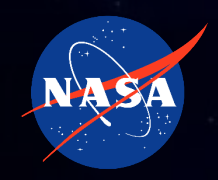
- NASA requires that the PAM commander be a former flown NASA astronaut to ensure PAMs are executed in a manner that both complements and minimizes impact to the overall ISS mission.
- Former NASA astronauts provide:
 - Guidance for the PAs during pre-flight preparation through mission execution
 - Serve as a link between the resident ISS expedition crew and the PAs, reducing risk to ISS operations and PAM/ISS safety
- PACE Annex 1 Location: Appendix F



Research Integration

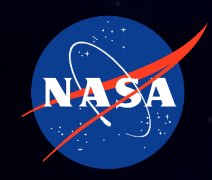


- Early definition of payload complements and research objectives enables NASA to:
 - Perform feasibility assessments
 - Understand payload facility usage requests
 - Determine certification paths
 - Complete applicable institutional review boards (e.g., for human research)
- NASA requires the PAM provider to submit research requests to the ISS National Laboratory (ISSNL) no later than 12 months prior to the PAM launch date.
- PACE Annex 1 Location: Section 1.4.2



Visiting Vehicle Integrated Operations

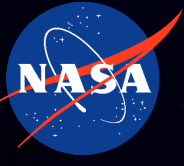
- Rendezvous, docking, and undocking are complex activities with many controls to mitigate collision risk. NASA requires the PAM USCV to implement autonomous operations and ISS crew monitoring capabilities as additional risk mitigation.
- Autonomous Vehicle Operations: The capability of the PAM USCV to operate autonomously for all nominal and contingency activities during integrated operations with ISS without a need for Private Astronaut crew intervention.
- ISS Crew Monitoring: The capability of the PAM USCV to send video data to ISS and receive commands from ISS, allowing the ISS crew to monitor the USCV during rendezvous and proximity operations.
- PACE Annex 1 Location: Sections 2.2.1



Mission Timeline Development & Execution

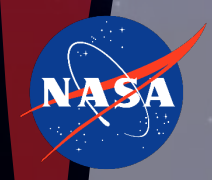


- Development of timelines and task execution for the Private Astronaut Mission need to account for adaptation and required NASA activities (e.g. handover).
- The Private Astronaut workday must:
 - Be scheduled within the bounds of the ISS crew workday
 - Adjust for adaptation, familiarization, and setup/teardown time
- The initial and final days docked to ISS are dedicated to handover and pre-undocking/packing activities defined by NASA
- PACE Annex 1 Location: Section 2.5.3



Communications and Outreach

- All communication and outreach activities that occur from mission kick-off through the end of the mission must be reviewed by NASA to ensure the appropriate policies are followed and the resources required by NASA are available to support the activities.
- NASA requires the submittal of a Communication Plan that provides to NASA the PAM Provider's strategy and plan to release information to the public.
- PACE Annex 2 Location: Section 7.14

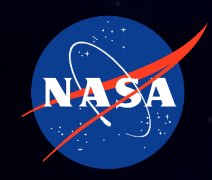


Announcement Overview

Leticia Vega, Ph.D

Program Executive, Commercial Activities on ISS, CLDP

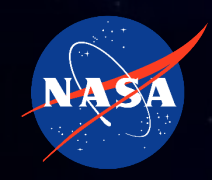
To ask questions, please use the MS Teams chat box



Proposal Submission



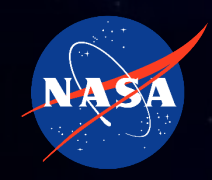
- Proposers may submit up to two proposals.
- Each proposal shall represent a single private astronaut mission concept.
- Each proposal will be evaluated for potential award of both flight opportunities that meets the launch window and sequence constraints provided in the proposal.
- Each proposal shall be submitted through NSPIRES separately.



Proposal Content

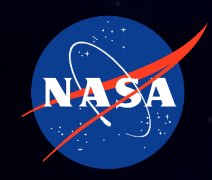


- Title Page (1 page)
- Proposal Abstract (not to exceed (NTE) 3 pages)
- Table of Contents (1 page)
- Mission Overview (NTE 12 pages)
- Mission Integration Approach (NTE 9 pages)
- Mission Business Approach (NTE 9 pages)
- Attachments
 - Project Schedule
 - Financial Statements (NTE 20 pages)
 - Evidence of revenue and sources of funds (NTE 10 pages)
 - Evidence of planned suppliers, teaming agreements, etc. (NTE 10 pages)
 - PAM Budget Table (no page limit)



Title Page and Table of Contents

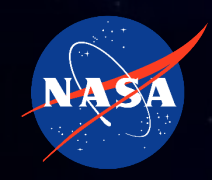
- Title Page:
 - Include any Notice of Restriction on Use and Disclosure of Proposal Information
 - The proposer and proposal name/title
 - Requirement is to be a US owned company
 - Date of the proposal
 - The title, NRA number, including version associated with announcement
 - Organization name and address
 - Proposer Point of Contact name, title, e-mail address, and phone number
- Table of Contents (1 page):
 - Include a one-page Table of Contents that provides a guide to the organization and contents of the proposal.



Proposal Abstract



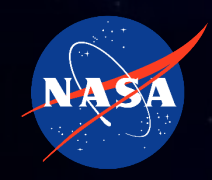
- In no more than three (3) pages:
 - Provide an overview of the proposed mission concept, including key mission parameters, objectives, teaming arrangements, and constraints, as well as the proposer's experience, capabilities and qualifications.
 - Clearly define all mission objectives. Multiple mission objectives are encouraged.
 - Describe how proposed mission fit in with the vision of LEO commercialization and the objectives of the solicitation



Mission Overview



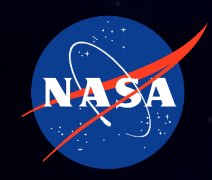
- In no more than twelve (12) pages:
 - Describe the concept of operations, details, and parameters of the proposed mission, as well as any areas of flexibility and/or constraints that have implications to mission execution or scheduling.
- Include statement of acknowledgement and acceptance of the terms and conditions associated with the NASA PAM framework as documented in the generic PAM Basic Ordering Agreement (BOA) and Mission Specific Order (MSO).



Mission Integration



- In no more than nine (9) pages:
 - Describe the experience, capabilities, qualifications, resources, and key mission personnel of the PAM Provider and any key partners and contractors.
 - Describe the approach, methods, pertinent teaming arrangements, and integration schedule/milestones for key areas of mission integration.
 - Describe the approach and teaming arrangements to support launch and landing services.
 - Provide a description of roles and responsibilities for the proposer and all related entities, including primary interfaces with NASA and the transportation provider.
 - Describe the major services, facilities, resources, and equipment required from NASA in order to execute the proposed mission. Private Astronaut Resources, Interfaces, and Services (PARIS) for ISS, as a resource to assist in the identification of potential services needed. Include any unique or non-standard requests for services.



Mission Business Approach

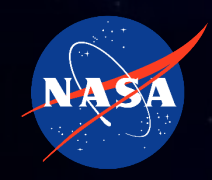


- In no more than nine (9) pages
 - Describe the financial health of the PAM provider executing the proposed mission in order to demonstrate the ability to accomplish mission activities for the duration of the integration and execution of the proposal. Attach financial statements (cash flow, balance sheet, and income statement) for the last three years.
 - Identify the total costs of the mission, including costs of services procured from NASA as described in the current NASA pricing policy, as well as those from commercial suppliers and any other government partnerships required to execute the mission. Summarize the cash flow of the mission, including phasing of revenue and cost.
 - Define the plan for obtaining required funds, including mission revenue, internal funds from other company operations, and/or external financing. Attach any evidence such as signed letters of intent (e.g. with private astronauts on this mission).
 - Provide a status of teaming/supplier agreements and/or partnerships with other commercial and/or government entities. Attach any evidence such as signed letters of intent (e.g. with transportation provider).
 - Provide a description of any services or commercial offerings being presented to NASA as a part of the proposal.



PAM Commander Experience

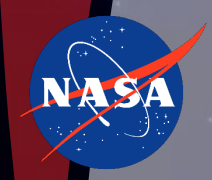
- In no more than 10 pages:
 - Describe the quality of performance and effectiveness of the proposed PAM Commander's previous experience with the experience requirements in Appendix F of SSP 51087 - ANX1, Private Astronaut Mission (PAM) Authorization, Coordination and Execution (PACE) Annex 1.
 - Provide details of applicable human spaceflight experience of proposed PAM commander.
- In addition to the information above, Proposers shall submit the PAM Commander Reference Form for three references, preferably from previous supervisors or managers in the Flight Operations Directorate, while the proposed PAM Commander served in their former government astronaut role.
 - The references shall return the form directly to the Contracting Officer via e-mail per the contact information provided on the attachment.



Attachments



- Project Schedule (delivered in Microsoft Excel (.xlsx) format)
 - No page limit; however data that is not schedule data will not be considered
- Financial statements (not to exceed 20 pages)
- Evidence of revenue and sources of funds (not to exceed 10 pages)
- Evidence of planned suppliers, teaming agreements, etc. (not to exceed 10 pages)
- PAM Budget Table (no page limit)

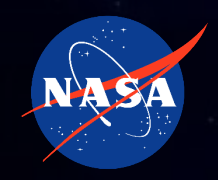


Evaluation Process & Schedule

Leticia Vega, Ph.D

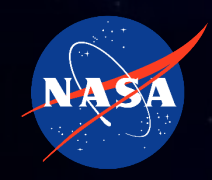
Program Executive, Commercial Activities on ISS, CLDP

To ask questions, please use the MSTeams chat box



Evaluation Criteria and Summary

- Proposals will be evaluated against three factors:
 - **Merit:** The credibility of executing the proposed technical and business approaches within NASA's outlined framework, and the ability to meet NASA's requirements
 - **NASA Supportability:** Evaluation of NASA's ability to provide the necessary resources to support the PAM objectives on the proposed integration timeline without negative impact to ISS's mission objectives
 - **Relevance:** Proposal's potential contribution to NASA's mission and objectives



Evaluation Process



- **Step 1**

NASA will screen the proposals for compliance with the requirements of the solicitation

- **Step 2**

Proposals will be evaluated against three factors

- Factors 1 and 2 (Merit and Supportability) are of equal importance, and each are more important than Factor 3 (Relevance).

- **Step 3**

NASA will make selection(s) based on the three factors, the flight opportunities available, and the flight planning and scheduling constraints provided in the proposal, and programmatic considerations

- Proposal Announcement
- Pre-Proposal Conference
- Proposals Due to NASA
- Award Flight Opportunities
- Contract Negotiations
- PAM-3 & -4 Kickoff
- PAM-3 Launch
- PAM-4 Launch

Sept 14th, 2022

Sept 16th, 2022

Oct 27th (at 5pm ET)

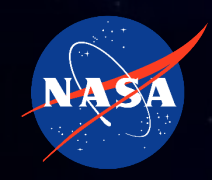
Late 2022/Early 2023

Late 2022/Early 2023

Two weeks after contract signing

NET late 2023 through mid 2024

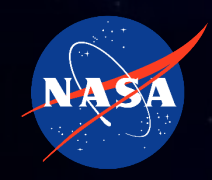
NET mid 2024 through end of 2024



Technical Reference Library



- Critical Documents to Review & Understand
 - **PAM Basic Ordering Agreement (BOA)** – Contains basic terms and conditions necessary to enter into an agreement with NASA to execute a PAM
 - **PAM Mission Specific Order (MSO)** – Contains additional terms that are necessary in order to contract for each PAM.
 - **SSP 51087-ANX1 PACE Annex 1** – Defines requirements that a PAM Provider will be obligated to meet in order to plan and execute a PAM
 - **SSP 51087-ANX2 PACE Annex 2** – Defines the contract deliverables associated with executing a PAM
- Additional reference documents can be found in the technical library

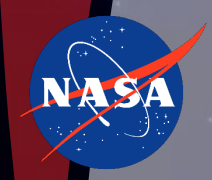


Communications

- All communications with industry will be handled by the Contracting Officer:
kelly.l.rubio@nasa.gov

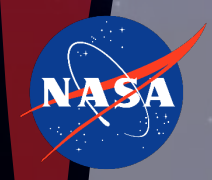
How to Get Connected

- PAM Website
 - <https://www.nasa.gov/jsc/procurement/pamsiss>
- NASA/JSC Contract Opportunities
 - <https://sam.gov/>
- JSC Procurement Website
 - <https://www.nasa.gov/jsc/procurement>
- Office of Small Business Programs, JSC Bldg. 1
 - jsc-industry-assistance@mail.nasa



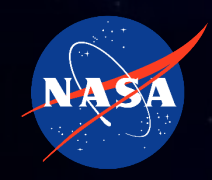
Questions and Answers

To ask questions, please use the MSTeams chat box



BACKUP

To ask questions, please use the MS Teams chat box



PAM Commander Requirements



- Former NASA (U.S.) flown government astronaut
- Experience maintaining a harmonious and cohesive relationship among crewmembers and an appropriate level of mutual confidence and respect through an interactive, participative, and relationship-oriented approach, having taken into account the international and multicultural nature of the crew and mission
- Experience leading crewmembers to accomplish a specific goal during pre-flight, on-orbit, and post-flight activities
- Demonstrated spacecraft system and hardware expertise (e.g., Information Technology (IT) hardware, scheduling applications, hygiene systems, food systems, still photo cameras, video cameras, microphones, communication systems, etc.) during a spaceflight mission
- Experience fully and accurately communicating with the chain of command and with the ground teams in a timely manner during mission activities
- Experience adhering to Code of Conduct for the International Space Station Crew (14 C.F.R. 1214.403) or equivalent
- Experience adhering to the Standards of Ethical Conduct for Employees of the Executive Branch (5 C.F.R. Part 2635)
- Experience following direction per the chain of command during mission activities
- Demonstrated ability giving critical feedback when the receiver is not receptive to the message. Demonstrated ability receiving critical feedback and implementing corrective actions.
- Experience maintaining order, enforcing procedures, and taking effective actions in challenging and evolving operational environments during a spaceflight mission