

# SCIENCE MISSION DIRECTORATE POLICY

## Initiating Contributions to International Partner-led Missions

### SMD POLICY DOCUMENT SPD-47

Responsible SMD Official: Deputy Associate Administrator for Research

#### 1. Background

1.1 NASA participates in missions in partnership with the international community. A large number of NASA's space and Earth science missions are performed with international partners. Many NASA-led missions include contributions from international partners. Many international partner-led missions contain contributions from NASA. These contributions are generally instruments or other space flight hardware, but launch services, space communication services, and ground systems have also been contributed.

1.2 For two decades (approximately 2000-2020) NASA solicited proposals for NASA-funded, PI-led contributions to international partner-led missions using an Announcement of Opportunity (AO). These investigations were referred to as Partner Missions of Opportunity (PMOs). Over the decade 2010-2020, NASA received 17 PMO proposals and selected only one for flight. Many NASA contributions to international partner-led missions were established during this period using processes other than the PMO process.

1.3 Based on two decades of data, the PMO process appears not to be as effective and efficient as intended to establish NASA contributions to international partner-led missions. In 2020 NASA decided to no longer solicit PMO proposals.

1.4 This SMD Policy Document (SPD) sets forward the new process for establishing a NASA contribution to an international partner-led mission.

#### 2. Overview of Process

2.1 This SMD Policy Document (SPD) lays out the process that SMD will use for initiating and adjudicating NASA contributions to international partner-led missions. The steps of this process are listed here and are explained in more detail in the subsequent sections of this policy document.

- 2.1.1 Identification of an Opportunity
- 2.2.2 Description of an Opportunity
- 2.2.3 Consideration of an Opportunity
- 2.2.4 First Decision regarding an Opportunity
- 2.2.5 First Response regarding an Opportunity
- 2.2.6 Study the Opportunity
- 2.2.7 Final Response regarding an Opportunity
- 2.2.8 Implement the International Partnership as appropriate

### 3. Detailed Process

#### 3.1 *Identification of an Opportunity*

An opportunity for a NASA contribution to an international partner-led mission is identified when an idea is brought to SMD's attention.

3.1.1 The idea could be brought to SMD's attention by an international partner seeking a NASA contribution.

(a) The idea can be brought forward at either the Division level (to the Division Director) or the SMD level (to the Associate Administrator).

(b) If it is brought forward at the SMD level, it should be pre-briefed at the Division level in advance. In all cases, subsequent consideration by NASA will be led by the appropriate Division.

3.1.2 The idea could be brought forward by a NASA Center.

(a) It is assumed that the Center has been in contact with a counterpart in the mission's lead country, either directly with the international partner or with an implementing organization.

(b) The idea should be brought forward at the Division level to the appropriate Division Director.

3.1.3 The idea could be brought forward by any member of the community; the more specific the suggested idea, the better.

(a) A community member may submit an idea to the appropriate Division Director at any time.

(b) SMD will issue an NSPIRES notice annually informing the community of this open opportunity.

3.1.4 Any submission should address as many of the descriptive and advocacy elements of Section 3.2. Description of an Opportunity as possible.

#### 3.2 *Description of an Opportunity*

SMD should ensure it has adequate information to consider the idea.

3.2.1 Even before gathering more detailed mission and contribution data, a negative answer may be obvious from programmatic considerations.

(a) Programmatic considerations that may result in a negative answer include: the opportunity is low priority, the opportunity is unaffordable,

the opportunity does not fit in with the balanced portfolio, the opportunity is scientifically redundant with the current program, *etc.*

(b) When the opportunity is declined due to programmatic considerations, a preliminary response should be given to the international partner (Section 3.5).

(c) If appropriate, the source of the idea (i.e., the Center or the community member) should be informed of the preliminary response.

(d) In the case of an immediate negative answer, it is not necessary to gather additional information.

3.2.2 SMD, through the appropriate Division, should gather, at a minimum, the following information from the U.S. advocate for the contribution (*i.e.*, the Center or the community member) and other sources, to the extent that the information is known:

(a) Information about the host mission (science objectives, notional mission architecture and capabilities, other known or potential international partnerships, notional schedule, programmatic status in host agency)

(b) Information about the proposed NASA contribution (technical description, notional cost and schedule)

3.2.3 SMD, through the appropriate Division, should gather arguments from the U.S. advocate for the contribution (i.e., the Center or the community member) and other sources:

(a) How does this proposed NASA contribution support NASA's science objectives, Decadal Survey priorities and recommendations, community recommendations, *etc.*?

(b) How does it complement the NASA mission plan, the SMD Science Plan, the Division's implementation plan/roadmap?

(c) Why is it appropriate for NASA to make this particular contribution, *e.g.*, does it draw on unique U.S. capabilities, does it draw on U.S. mature or heritage technology, does it offer compelling science to the U.S. science community at an acceptable cost and risk?

(d) What does the U.S. science community get out of the proposed international partnership, *e.g.*, will there be open opportunities for participation by U.S. scientists, will the data be publicly available in a useable form to the U.S. and international science community?

### 3.3 Consideration of an Opportunity

SMD should consider the idea. Consideration of a proposed NASA contribution to an international partner-led mission is an inherently subjective process.

3.3.1 SMD should consider the scientific, technical, schedule and programmatic aspects of the proposed NASA contribution to an international partner-led mission.

(a) Does this proposed international partnership sufficiently advance SMD's science goals? SMD's science goals include whether the science is high priority, whether such an international partnership is consistent with implementing the appropriate Decadal Survey, *etc.*

i. It might not be possible to answer this question without a study or solicited proposal, followed by an independent peer review.

(b) Is this proposed international partnership feasible at acceptable risk? This consideration includes the heritage of the proposed contribution, the technology readiness of the proposed contribution, SMD's plans for continuing investment in relevant technologies, *etc.*

(c) Can SMD afford this proposed international partnership? Affordability includes the availability of the budget required, as well as whether this proposed international partnership aligns well with SMD's portfolio or whether it causes imbalance, including imbalance between NASA-led missions and partner-led missions.

(d) Does SMD want to be the junior partner on this mission or similar missions? This consideration includes whether this proposed international partnership complements SMD's missions and mission portfolio, whether this proposed international partnership would displace a planned or potential future SMD mission, *etc.*

i. It might not be possible to answer this question without a study or solicited proposal, followed by an independent peer review.

(e) Does the timing of the proposed contribution, the host mission, and the necessary budget align with SMD's planned investments and investigations?

(f) What are the considerations regarding the broader contextual relationship with the proposed partner and the timing of the proposed international partnership, as well as and constraints on NASA's ability to enter into an international agreement with the partner?

3.3.2 SMD should consider whether this partnership would meet the criteria in SPD-37 on Principles for Collaborations on Missions with International Partners. SMD should consider whether the proposed international partnership will:

- (a) Expand U.S. leadership in space and Earth science (*i.e.*, NASA partners strategically with international counterparts when such collaboration supports NASA's highest priorities, per decadal survey, agency priorities, or anticipating impact and visibility at a civilization level); or
- (b) Align the international space and Earth Science community with U.S. values and policy constructs (*e.g.*, "peaceful use of outer space," open data, open models, merit-based competition); or
- (c) Allow NASA access to international capabilities critical for strategic missions but not of sufficiently high priority for U.S. to develop or implement; or
- (d) Leverage technology developed for earlier missions for increased science gain; or
- (e) Solidify NASA as the partner of choice for new entrants; or
- (f) Introduce emerging partners to NASA science standards and methods.

#### 3.4 *Preliminary Decision regarding an Opportunity*

The SMD Associate Administrator (AA) is the decision authority for NASA contributions to partner-led missions.

3.4.1 The appropriate Division Director will discuss the opportunity with the SMD AA.

3.4.2 The SMD AA can request that the issue be brought to a meeting of the SMD Science Management Council (SMaC) for a wider discussion.

3.4.3 With input from the appropriate Division Director, and optionally the SMaC, the SMD AA will decide on a preliminary response and next steps.

3.4.4 The SMD AA may delegate to the Division Directors decision authority for smaller contributions to partner-led missions. Smaller contributions are generally consistent with suborbital-class investigations or ISS pressurized payload investigations in the research programs.

#### 3.5 *First Response regarding an Opportunity*

The SMD AA, or their delegate, in coordination with OIIR, will provide a preliminary response to the proposed international partner.

3.5.1 The proposed opportunity can be declined for any one of the considerations described in Sections 3.2 or 3.3

(a) No further steps in this policy document are undertaken.

3.5.2 The proposed opportunity can be preliminarily accepted.

(a) Implementation of the opportunity should now be undertaken; see Section 3.8.

3.5.3 If there is insufficient information to support a decision, then further study should be undertaken.

(a) The response to the proposed international partner should indicate that there is interest on NASA's part, but that a final decision depends on acquiring additional information, generally more definition of the proposed schedule, cost and risk.

(b) SMD should propose the next step forward, generally a joint study or a more definitive proposal. See Section 3.6.

(c) SMD should make it clear that its final decision will depend on the outcome of the study or proposal, and that conducting a study, or requesting the proposal, is not an indication of commitment; SMD reserves the right to decline the proposed opportunity for any reason, including that it is too expensive, too risky, or offers inadequate science return to the U.S. community.

(d) After completing the study, come back to the AA/SMaC and repeat the steps in Sections 3.3 and 3.4.

3.5.4 If appropriate, the source of the idea (*i.e.*, the Center or the community member) should be informed of the preliminary response.

### 3.6 *Study the Opportunity*

SMD, in partnership or in consultation with the proposed international partner and supported by the Office of International and Interagency Relations (OIIR), will conduct an appropriate study or will request an appropriate proposal. The purpose of this exercise is to provide the decision authority with all of the information needed to make a final decision regarding the proposed contribution to the partner-led mission.

3.6.1 The circumstances for every proposed partnership are unique at this point. The SMD AA and the appropriate Division Director will structure the study or proposal request to meet the needs of the individual circumstance.

3.6.2 Generally speaking, it may be necessary to have technical information comparable to that included in a PMO proposal to enable a final decision (see Appendix A for an example). Only when a proposed opportunity has passed programmatic and preliminary science, technical, and cost scrutiny will a study or proposal be requested.

3.6.3 Before conducting a study, thought should be given as to the impact of the selection of study participants on any future open competition.

(a) If a study is for a specific NASA contribution, then the selection of study participants may constrain the acquisition strategy, should NASA proceed with the partnership.

3.6.4 After completing the study or evaluating a proposal, preliminary feedback on the findings of the study should be provided to the international partner.

### 3.7 *Final Response regarding an Opportunity*

The SMD AA, or their delegate, will provide a final response to the proposed international partner.

3.7.1 Accepted partnerships should comply with SMD's policies on value in international partnerships (SPD-37) and mitigating risk in international partnerships (SPD-38).

3.7.2 OIIR should be included as appropriate in discussions with the international partner.

### 3.8 *Implement the International Partnership as appropriate*

If a decision is made for NASA to provide a contribution to an international partner-led mission, then a NASA project needs to be established to meet NASA's obligations within the international partnership.

3.8.1 The SMD AA will assign responsibility for the project to an SMD Division and an SMD Program.

3.8.2 SMD will enter into discussions with the international partner to establish roles and responsibilities.

3.8.3 SMD will establish an acquisition strategy for the project using its normal processes. In establishing the acquisition strategy for the NASA contribution, SMD will

(a) Consider whether there is only one possible U.S. provider or whether there are several possible U.S. providers; and

(b) Decide whether the NASA contribution will be determined through the international partner's solicitation process, a joint NASA-Partner Agency solicitation, or a NASA process.

3.8.4 In support of establishing roles and responsibilities as well as establishing an acquisition strategy, SMD will consider whether competitive proposals are needed to determine the exact U.S. contribution, or whether the nature (architecture, technology) of the contribution is determined by the nature of the partnership.

(a) If there is only one possible U.S. provider, then the work can be directed either internally or through a sole source process.

(b) If there are multiple possible U.S. providers primarily within NASA Centers, then the work can be assigned following an internal decision process and directed internally.

(c) If there are multiple possible U.S. providers including external organizations, then the work can be assigned through full and open competition by issuing a focused solicitation.



## **Appendix A: Technical Information Requested from Partner Mission of Opportunity (PMO) Proposals in SALMON-3 AO**

Requirement 4: Proposals for PMOs shall provide a Letter of Commitment from the sponsoring organization stating that the sponsoring organization (1) intends to fund the parent mission, and (2) that the endorsement of NASA for U.S. PMO participation is required by the sponsoring organization prior to the endorsement date listed in the applicable PEA.

NASA will evaluate the proposed investigation content and feasibility, and not the sponsor's entire mission therefore the PI must demonstrate how the proposed PMO is independent or enables or enhances the parent/host mission (see Requirement 15).

Requirement 5. While the investigator is not required to document the entire mission of the sponsor, proposals for PMOs shall meet the following requirements:

- (i) The proposal shall fully document the complete PMO investigation and how it will be accomplished within the sponsor's mission.
- (ii) The proposal shall identify the mission opportunity or opportunities and shall provide evidence in the proposal that the mission provider agrees to manifest the PMO investigation should the proposal be selected and confirmed for flight by NASA.
- (iii) The proposal shall describe the accommodation, including allocations of mass, power, volume, and data (see Requirement B-27 for additional details), demonstrate compatibility with the proposed host mission and show how the host will fulfill the mission requirements. This documentation must be sufficient to allow an evaluation of the adequacy of the sponsor's mission to provide all resources required for a successful investigation.
- (iv) The proposer shall identify and obtain appropriate commitments from the sponsor organization(s) that will provide the payload accommodations.

NASA investigations are initiated primarily for the conduct and publication of scientific, exploration, and technology research and disseminating those results for the benefit of the U.S. science community. As such, NASA expects that the mission sponsor will enter into an agreement with NASA to assure that data returned from at least those aspects of the mission in which NASA support is involved, if not the entire mission, will be made available to the U.S. research community in a timely way and deposited in an appropriate NASA data archive. NASA will seek to conclude an international agreement with the mission sponsor in advance of launch to ensure that this activity will be performed. NASA recognizes that PMO investigation teams may justifiably incur additional data analysis responsibilities defined by the policies of the sponsor of the parent mission.

Requirement 7. Proposals for PMOs shall demonstrate that the data obtained and the research conducted will benefit the NASA community

For PMOs, NASA will evaluate the goals and objectives of proposed investigation within the parent/host mission and not the sponsor's entire mission, therefore the PI must clearly

demonstrate how the proposed PMO is independent of or enables or enhances the parent/host mission.

Requirement 15. For PMOs, proposals shall demonstrate how the proposed PMO goals and objectives are independent of or enables or enhances the parent/host mission.

Requirement B-27. Instrument Resource Contingencies and Margins: This section shall summarize contingencies and margins of all instrument resources. It shall provide estimates of implementation design margins with respect to the required performance or allocations for mass, power, data storage, and any other resource requirements. For proposals for more than one instrument, the mass, telemetry, and power and contingency and margins shall be identified separately for all the necessary components of each instrument in case only an individual instrument is selected from the proposed suite (see below for definitions of contingency and margin). The allocation of contingency and margin to the instrument and/or suite shall be discussed.

Definitions:

Contingency. when added to the current estimate for a resource, results in the maximum expected value for that resource. Percent contingency is the value of the contingency divided by the value of the resource, less the contingency.

Margin is the difference between the maximum possible capability of a resource (the physical limit or the agreed-to limit) and the maximum expected value for a resource. Percent margin for a resource is the available margin divided by its maximum expected value.

Example 1: A payload in the design phase has a maximum expected mass of 115 kg including a mass contingency of 15 kg. There is no other payload on the ELV and the ELV provider plans to allot the payload the full capability of the vehicle, if needed. The ELV capability is 200 kg. The mass contingency is  $15/100 = 15\%$  and the mass margin is 85 kg or  $85/115 = 74\%$ .

Example 2: The end-of-life (EOL) capability of a spacecraft power system is 200 Watts, of which 75 Watts has been allocated to the instrument and 100 Watts has been allocated to the spacecraft bus. The power margin is the unallocated 25 Watts or  $25/175 = 14.3\%$ . The current best estimate for the instrument power is 60 Watts, leaving 15 Watts or  $15/60 = 25\%$  contingency to the 75 Watt maximum expected value.

Acknowledging that the maximum expected resource value is equal to the maximum proposed resource value (including contingency), the above technical terms can be expressed in equation form as:

$$\text{Contingency} = \text{Max Expected Resource Value} - \text{Current Estimate of Resource Value}$$

$$\% \text{ Contingency} = \frac{\text{Contingency}}{\text{Max Expected Resource Value} - \text{Contingency}} \times 100\%$$

Margin = Max Possible Resource Value – Max Expected Resource Value

$$\% \text{ Margin} = \frac{\text{Margin}}{\text{Max Expected Resource Value}} \times 100\%$$