

New Frontiers 4 AO Q&A

Updated 4/19/17

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Additional questions may be addressed to Dr. Curt Niebur, Lead Program Scientist for the New Frontiers Program, at curt.niebur@nasa.gov. Questions (which may be abridged for brevity and paraphrased to ensure anonymity) and answers will be posted at the above URL approximately once a week.

Note: the deadline for submitting questions is April 14, 2017.

Log of Questions

January 13, 2017: Q-1 through Q-09 posted

February 2, 2017: Q-10 through Q-20 posted

February 21, 2017: Q-21 through Q-28 posted; update to Q-18 posted

March 6, 2017: Q-29 through Q-31 posted

March 31, 2017: Q-32 posted

April 10, 2017: Q-33 posted

April 19, 2017: Q-34 and Q-35 posted

Q-01 The 4-m fairing depicted in Figure 2 of the NF ELV Launch Services Program Information

Summary has the same diameter, but is significantly shorter in height (138.7 in vs 157.9 in), than the dimensions available to Discovery 2014 proposers for a 4-m fairing, which was equivalent to the Atlas V LPF fairing. Is the new, shorter height correct? Use of the height shown would constrain spacecraft designs that could otherwise use a 4-m fairing and conform with the mass and C3 performance for that vehicle size. As a result, a mission could be forced to incur the high cost penalty of a 5-m fairing based on a fairing height constraint rather than a LV performance requirement. NASA’s intention “to ensure compatibility with all current potential launch vehicle configurations” suggests that a composite of fairing dimensions was considered in the crafting of the envelope shown. Can a range of height dimensions for a fairing of this 4-m diameter be provided, up to the Atlas V LPF dimensions, so that proposers can efficiently use spacecraft configurations that fit previously available fairing sizes offered by NASA?

Yes, the envelope provided is the standard service with a standard payload adapter and is correct for the performance range shown.

The fairing envelope(s) provided ensures compatibility with all current potential launch vehicle configurations. If a proposed configuration does not fit within the fairing envelope provided it may not be compatible with all current potential launch vehicle configurations within that performance range shown and will be evaluated accordingly.

Q-02 The Atlas V 4-m family also includes options for longer fairings, specifically the EPF and XEPF. Can such longer fairing options be available to New Frontiers proposers? If so, will they be considered a non-standard service? Can cost and performance data be made available for those fairing options?

The EPF and XEPF are available to NASA as a non-standard service. A proposer may request the use of a larger fairing as a non-standard service and will be provided cost and performance data individually upon request from a proposer (please contact Mary. K. Faller at mary.k.faller@nasa.gov for this information). However, the fairing envelope(s) provided ensures compatibility with all current potential launch vehicle configurations. If a proposed configuration does not fit within the fairing envelope provided for a given performance class it may not be compatible with all current potential launch vehicle configurations within that performance range shown and will be evaluated accordingly.

Q-03 The most recent document does not include an envelope for a 5-m fairing. Will a 5-m fairing be offered by the Announcement of Opportunity? If so, what will be its dimensions?

A 5-m fairing is a not part of the baseline configuration and thus dimensions will be offered individually upon request from a proposer. Please contact Mary. K. Faller at mary.k.faller@nasa.gov for this information.

Q-04 Requirement B-53 states, "Input file(s) and results for a single parametric cost model for Phases A-D shall be provided on each CD-ROM submitted." However, Requirement B-6 indicates that multiple files may be included on the electronic submittal, "parametric cost input file(s) and model results (see Requirement B-53)". Please expand on what is meant by "single parametric model". Is it permissible to use, for example, PRICE-H for cost estimation of hardware elements and SEER-SEM for cost estimation of flight software, and submit input files for each tool? The AO permits the use of NICM with PCEC. Should input files be submitted for both the NICM tool and PCEC tool?

Yes, it is permissible to use a combination of models. However, no more than one model should be provided as the benchmark model for any type of element (i.e. don't provide both a SEER and a PRICE model for the bus hardware as the benchmark). The intent of the benchmark model is to provide NASA with insight, within an integrated parametric modeling environment, into the basis of the proposed cost. The use of extensive comments in the benchmark cost model is strongly encouraged as a method of providing additional cost information to NASA.

Q-05 Page B-28 (after Req B-69) regarding the power values in the MEL: “Power values should represent nominal steady-state operational power requirements”. Does this refer to the “nominal steady-state” power of each component when operating (in which case the sum of all power values shown will represent a fictitious power mode where all components would be on simultaneously), or does this refer to “nominal steady-state” power of the entire flight system in the most relevant power mode (in which case the totals will be meaningful, but some components will be reported with 0 W power as they are not operating in that mode)?

For the MEL (section J.9), provide the nominal steady-state power of each component when operating. Additionally, for requirement B-32 (c), provide the expected power requirement for each mission phase by subsystem.

Q-06 The language of the AO states a launch no later than date of December 31, 2015. The Draft AO had listed a launch NLT date of 12/31/24, or 12/31/25 if radioisotope power sources were required. This implied (although not explicitly stated) that either additional schedule was required when using RPS, or that the RPS would not be available in time for a 2024 launch. Lastly, during the NF Technology Workshop, the RPS presentation specifically referred to a selected RPS mission launching in 2025. The language of the AO does not appear to specifically prohibit launching a RPS mission in 2024. If we assumed Phase B started mid-2019, there is sufficient time (~60 months) to launch in mid-2024. Additionally, during the 2010 Discovery cycle, the LAE office was stood up during Step 2 (Phase A) and we were able to begin this process earlier, which if replicated during this NF cycle would provide sufficient time to potentially launch earlier in 2024. Could a MMRTG and RHUs be available to support a launch any time in the 2024-2025 timeframe?

Missions utilizing MMRTG(s) and/or RHU(s) must launch no earlier than January 2025.

Q-07 Is the MS Project version of the schedule is to match that which is in the proposal (only 3 uncounted pages)? If there are questions relative to the schedule details, teams will not be able to point to the answers in the Preliminary Major Weakness exercise. So, is it understood that such questions would be out of bounds for a Step 1 proposal evaluation?”

The intent of the MS Project schedule file is to provide specific dates for the schedule elements contained in the proposal so evaluators are not reduced to physically measuring the lengths of Gantt charts and converting those measurements into time durations. The intent of the MS Project schedule file is not to provide additional information beyond that in the proposal in the form of an electronic file with thousands of schedule elements. Schedule will be an allowed topic during the clarification process (i.e., Preliminary Major Weakness exercise), however clarifications will have to reference the pdf schedule rather than the MS Project schedule file.

Q-08 Curation costs for comet sample return missions, which by their nature have long durations, will typically be incurred entirely within Phase E. Is it appropriate then to charge Phase E curation

costs against the PI-managed cost cap? Certainly curation costs are not the same as deferred Phase D work (defined in the draft AO as “development of ground or flight system software and the development, fabrication, or refurbishment of test-beds”). In fact, they are actually more akin to data analysis and archiving costs. So it seems to me that curation costs that are incurred in Phase E should be treated like other Phase E costs and not included in the PI-managed cost cap. By keeping costs for creation of a new comet surface sample curation facility outside the PI-managed cost cap, NASA would also avoid encouraging proposing teams to shortchange curation in a way that could be detrimental to the long-term interests of the broad planetary materials community.

The AO states that “The actual costs for all aspects of curation, from planning through distribution and storage, including all required laboratory construction or modification, shall be borne by the mission from inception to two years following sample return.” It is implicitly understood that curation activities (and their associated costs) during Phases A-D fall under the AO Cost Cap and activities during Phase E fall under the PI-Managed Mission Cost (but not the AO Cost Cap). Proposers are cautioned that inappropriately deferring curation activities from Phases A-D to Phases E-F will result in them being considered deferred Phase D work and applied against the Cost Cap.

Q-09 Microsoft Excel templates of tables (Item 12) and other items in 12 are still missing in the Program Library - 1. The link is broken.

This has been fixed.

Q-10 Can you clarify the terminology for page calculation of “additional” instruments and “additional” flight elements. This was P-43 in the answers for the recent Discovery AO Q&A. May we make the same interpretation? (i.e. if a mission has 4 instruments, they get 8 additional pages).

Yes, you may use the same rationale as was given in the 2014 Discovery AO. Each unique instrument generates an additional two pages in Sections D and E beyond the limit of 30 pages, and each unique flight element generates an additional two pages in Section F beyond the limit of 35 pages.

Q-11 Is it allowed to add a Co-Investigator a month from now? Or some other time prior to the proposal due date, but after the NOI due date?

Yes. We recognize that proposals evolve during preparation and that there may be a need for an additional team member. Please email the program officer as soon as that addition is confirmed, as it may impact the composition of the evaluation panel.

Q-12 I submitted my NOI and I received a number, but I did not get an email verifying submission. Did you get it?

Note that the NSPIRES system does not email proposers when their NOI has been submitted; the confirmation page (which provides the number) and the fact that your record has now moved to your “Submitted NOIs/Proposals” page are the only confirmations. The Program Scientist has emailed all PIs listed on submitted NOIs. If you have not received an email, please contact the Program Scientist immediately.

Q-13 On page 5 of the NASA Plan: Increasing Access to the Results of Scientific Research is the following exclusion:

Exclusion: NASA creates and provides a large suite of scientific and engineering “data products” whose dissemination to the research community and the general public advance the Agency’s core mission objectives. These “data products” come from NASA missions, instruments, and projects and typically have well-established scientific or technological goals and requirements. Subject to Federal laws regarding sensitive data and privacy, these data products are captured and archived by NASA for public access and use and are thus already compliant with the OSTP February 22, 2013, memorandum on access to research results. This plan therefore excludes these types of data.

The data management plan that is required as an appendix of the Concept Study Report will meet the objectives of this document and deferring the data management plan is more consistent with the results of the changes to standard AO, that deferred the “schedule based data management plan” that was in the previous version.

I note that the “NASA Plan for Increasing Access to the Results of Scientific Research” indicates that mission data are excluded since those missions have their own plans. So why are we responding to it?

As discussed at the Pre-Proposal Conference and in the AO, the Data Management Plan is part of the Data Archive Plan. Requirement B-23 states that for Step 1, the Data Archive Plan (including the portion describing the Data Management Plan) is a narrative description and that a detailed plan or schedule is deferred to Step 2.

The document “NASA Plan for Increasing Access to the Results of Scientific Research” contains an exclusion for the mission data products in terms of scope of the access to data (Section 3). However, as discussed under Requirements (Section 4), is “All proposals or project plans submitted to NASA for scientific research funding will be required to include a Data Management Plan (DMP).” Therefore, Step-1 proposals are required to cover the Data Management covering those aspects of the DMP as appropriate as part of the Data Archive Plan at a level of detail commensurate with Requirement B-23 in the AO.

Q-14 Do you plan to conduct the clarifications on the science and technical criteria in two stages or all at once?

A final decision has not been made at this time. Prior to the clarification process NASA will consider the logistics, schedule needs, and PI preferences before making a final decision.

Q-15 Is it allowed to propose a launch date earlier than the AO states, for example, in 2023.

The AO provides a Launch Readiness Date (LRD) of no later than December 31, 2025, and there is no requirement prohibiting earlier launch dates. However, as discussed in Section 4.3.3 Mission Funding Profile, the New Frontiers Program planning budget can accommodate a typical funding profile over a nominal five-year development period stretching from the selection date to the LRD. Proposers must not assume that NASA can accommodate a budget profile that significantly differs from this. For this reason, among others, proposers are encouraged to briefly discuss launch date flexibility inherent in their target choice(s) and mission design.

Q-16 Is it NASA's intent to provide the numerical values that define the C3-Mass to orbit color graphic curves in the LV services document that define the Low, Med and High launch categories? The curves are good but if a mission plots close to the line between High vs Med, there could be ambiguity in the TMC assessment resulting in a \$22M charge against the proposing mission.

For situations where ambiguity is possible proposers should contact Mary. K. Faller at mary.k.faller@nasa.gov for more precise information.

Q-17 How should export controlled information be denoted in proposals?

As stated in Requirement 89 of the AO, if a proposal contains export controlled material, the statement provided in the AO shall be included in the proposal. Additionally, the identified information (data) is (are) to be printed in a red font and figure(s) and table(s) containing the identified information (data) is (are) placed in a red-bordered box. Paragraphs containing many scattered references to export-controlled material may alternatively be contained in red boxes. An amendment to the AO will be released with this update.

Q-18 Do proposers need to provide a redacted version of the proposal that removes all export controlled information?

Updated in Question 21.

~~Yes, as discussed at the Pre-Proposal Conference, all proposers must submit a redacted version of their proposal containing no export controlled material. This redacted version should comply to the same formatting requirements as the full proposal and must be otherwise identical to the full~~

~~proposal submitted via NSPIRES. If any differences are noted the full proposal submitted via NSPIRES will be considered the official proposal. The redacted version must be included with other files submitted on CD-ROM by the May 5, 2017, date given in the AO. An amendment to the AO will be released with this update.~~

Q-19 In response to a question at the Pre-Proposal Conference, you stated that the 1/3 rule applied to instrument contributions applies to contributions of any kind, both foreign AND domestic. Some statements in the NF4 AO are consistent with this as was the Discovery 2014 AO. However, the FOREWARD contains the following additional statement: “The value of foreign instrument contributions are limited to one-third of the PI-Managed Instrument Cost.” This is in direct conflict with “contributions of any kind.” The Discovery TMC process only applied the 1/3 rule to foreign contributions (not domestic). Please clarify.

Most situations instrument contributions are in fact from non-U.S. sources, which is reflected in the text in the Foreword. However, the text in *Section 5.6.7 Contributions* refers to non-NASA contributions to the science instruments. Therefore, the one-third limitation includes both foreign and domestic instrument contributions to NASA.

Q-20 Finding a rayon vender using a NASA-qualified process to produce the necessary material can be difficult. Does PSD have any heritage carbonized rayon available for use by proposers?

SMD-PSD has procured and carbonized heritage rayon from the last qualified vendor, and this material can be used for making heritage PICA as used on previous missions such as OSIRIS-Rex. This carbonized heritage rayon will be made available for use by SMD planetary missions at no charge to proposers for the material. The quantity of carbonized heritage rayon is limited. Please contact Ethiraj Venkatapathy (ethiraj.venkatapathy-1@nasa.gov) or alternately Mairead Stackpoole (margret.m.stackpoole@nasa.gov) for more information.

Q-21 At the Pre-Proposal conference and in Question 18 it was stated that proposers would need to submit a redacted version of their proposals removing export controlled material and that an amendment to the AO would be released soon to document that requirement. Is this still the case?

After further discussion NASA has decided NOT to require proposers to submit a redacted version of their proposals. No amendment on this topic will be issued. Proposers are reminded they must denote all export controlled material and text in their proposals (see Requirement 89 and Question 17).

Q-22 Must missions using nuclear power sources provide the required documentation demonstrating the necessity of nuclear power in the Step 1 proposal?

Step 1 proposals should provide a very concise statement conveying the broad justification for the use of nuclear power. If selected this justification will be expanded during later development phases into the formal documentation needed as part of the launch approval process.

Q-23 Sections in the NF AO are in conflict with regard to the relationship between KDP-B and downselect. Section 4.1.1. NASA Flight Program and Project Requirements states “A Key Decision Point (KDP) occurs before the project is approved to begin the next phase of development; KDPs are defined in NPR 7120.5E. For missions selected as a result of this AO, KDP-A is the selection of a Step-1 proposal for a Phase A concept study. Phase A will extend some months beyond the downselection at the end of Step-2. KDP-B will be a standalone gate occurring after the Step-2 downselection.” However, Section 7.4.5 Downselection of Investigations states “Investigations may be downselected to enter Phase B or may be downselected for a funded Extended Phase A so one or more risks can be retired before it is allowed to proceed to Phase B. For investigations selected to enter Phase B immediately, the downselect serves as the Initial Confirmation Review gate (KDP-B).” Please clarify which is correct.

It is NASA’s intent to adhere to the plan in Section 4.1.1 and proposers should plan accordingly in Step 1 proposals.

Q-24 Please clarify that the \$4M NASA allocation for the Phase A concept study is intended to fund the 11-month concept study, Site Visit exercise and presentation to NASA AA. And please confirm that the post-downselect Phase A work to achieve KDP-B and transition to Phase B is funded separately.

This question reflects the intended interpretation.

Q-25 Table B4 (page B-36) does not list the 2015-to-2016 NASA inflation rate (the factor for FY 2016 is 1.000 even though the cost is to be calculated in FY 2015).

Table B4 has been updated with the table below.

Fiscal Year	2015	2016	2017	2018	2019	2020	2021	2022
Inflation Rate		2.6%	2.8%	2.8%	2.6%	2.6%	2.6%	2.6%
Cumulative Inflation Index	1.000	1.026	1.054	1.083	1.112	1.140	1.170	1.200

Q-26 It is clear that Phase E aperture fee/contact costs are no longer part of the PIMM cap but traditionally several million is typically carried for coordination and planning (paid to DSN) during development Phase B-C/D. Can you clarify if the mission still has to carry the development coordination and planning “fee” within our PIMM cap?

No, this fee does not need to be carried under the AO Cost Cap.

Q-27 Can you provide some guidance on calculating curation costs?

A spreadsheet (filename "NF Curation budget spreadsheet.xlsx") to assist with this has been posted in the Program Library. This spreadsheet provides guidance, not requirements, and proposers are encouraged to engage with sample return specialists to properly estimate basic curation costs.

Q-28 We noticed that Requirement B-36 in Section 3 Development Approach in the NF4 AO has changed significantly from the standard AO used for Discovery 2014 (B-38). For example:

- **System Engineering and Mission Assurance are missing but yet they are still identified in evaluation factor C-3. Are these items required to be addressed and if so, where in the outline?**
- **There are some vagaries about what "interface management" and "key Technical Performance Measures (TPMs)" mean. Can these be clarified?**
- **It also covers contract and acquisition strategy which feels like Section G material.**

The Standard AO was significantly modified since the Discovery 14 AO was released, and in this case the NF4 AO abides by the updated Standard AO. In response to the bulleted questions:

- New Frontiers AO requirement B-36 was changed from B-38 in the Discovery 2014 AO as part of the Standard AO update activity that occurred last year and will be in the new Standard AO Template when it is approved. Unfortunately, there were some items inadvertently left out of Requirement B-36. The text for Requirement B-36 in the NF4 AO should read (new text matching the updated Standard AO in bold):

*Requirement B-36. This section shall describe the **systems engineering** development approach. This description shall include the following items:*

- *Roles and responsibilities for the interface management process – as specified in NPR 7123.1B – and product development responsibilities;*
- *A description of how the interface management process will be developed and maintained;*
- ***Mission assurance approach, including (i) fault tolerance and fault management, (ii) product assurance, and (iii) reliability;***
- *Essential trade studies to be conducted in Phase A including the considered options and driving requirements;*
- *Identification of the key Technical Performance Measures (TPMs) – **as specified in NPR 7123.1B** – and descriptions of how these margins and reserves are to be allocated, tracked, and monitored, with what tools and by whom, and who will have the authority to release the associated reserves and margins;*

- *Descriptions of when contracts are required, the acquisition strategy, including any incentive strategy.*
- Proposers are encouraged to consult NPR 7123.1B for more information on Interface management and key technical performance measures.
- The contract and acquisition strategy description requirement was inserted here rather than in Section G as part of the Standard AO update activity that occurred last year and will be in the new Standard AO Template when it is approved. Please describe these with the other sections of Requirement B-36.

Q-29 The AO states that the risk of developing 3D woven TPS on time will not impact proposal evaluation (Table 4. Infusion strategies of NASA-developed technologies). However, it is unclear what risk NASA is shouldering to ensure readiness of HEEET. What is NASA's scope of TPS (thermal protection system) in this context and is there a specific TRL that applies? Please clarify that NASA will carry the risk through development of a mission representative engineering model or prototype heat shield tested in a relevant environment (to TRL 6) as implied in the Technology Workshop material?

NASA is committed to delivering the HEEET TPS system at TRL 6, meaning that mission-representative prototype hardware will be built and tested in relevant environments in a timely manner. TRL 6 for HEEET can be achieved with meaningful assemblies involving full-scale components, without requiring construction of a complete heatshield at scale for the selected mission.

For any proposal selected for a Phase A study, HEEET project personnel will be available to work with the proposal team on a TRL gap analysis between the generic ETU hardware built by the HEEET development project and the specific design for the mission. Where necessary, NASA will build, test and demonstrate HEEET elements at fully relevant scale to close any identified TRL gaps in a timely manner.

Q-30 If my mission falls outside of the low performance range, will this alter the enveloping launch vehicle characteristics?

It is possible that this would alter the enveloping launch vehicle characteristics. If relief from the enveloping launch vehicle characteristics is required, please utilize the point of contact listed in the ELV Launch Services Program Information Summary for any requested deviations.

Q-31 The response to Question 23 in the New Frontiers 4 AO Q&A states it is NASA's intent to adhere to the plan in Section 4.1.1 and proposers should plan accordingly in Step 1 proposals. That raises additional questions.

- **While section 4.1.1 references 7120.5E, it also contradicts it. Section 2.2.71 of 7120.5E states, "In a two-step AO process, projects are down-selected following evaluation of**

concept study reports and the down-selection serves as KDP B. Following this selection, the process becomes conventional with the exception that products normally required at KDP B that require Mission Directorate input or approval will be finished as early in Phase B as feasible". Please clarify if proposers are to follow 4.1.1 or 7120.5E.

- Given KDP-B will be a standalone gate occurring after the Step-2 down selection, this implies a formal SRB-led review will be required. However, Section 4.1.1 does not provide guidance for a formal SRB-led review for KDP-B. Typically, preparation for KDP-B requires 6 months to a year of effort following the process outlined in 7120.5E (gate products, data drops, peer reviews, etc.). If an SRB is required to be convened for KDP-B, please clarify expectations:
 - Will the proposed project follow the same review plan as directed missions and include either the SRR or MDR (or both) one month prior to KDP-B?
 - Is it correct to assume that a CMC, DPMC and APMC will be convened?
 - What is the expected time period between downselection (July 2019) and KDP-B?
 - What is the scope of work for the time period between downselection (July 2019) and KDP-B?
 - For example, are trade studies and risk reduction activities allowed? Is this time period included in the cost cap?

As stated in the AO, NASA intends to extend Phase A some months beyond the downselection. This period is intended to allow the selected flight investigation additional time prior to Phase B to mature technology and conduct risk reduction activities as well as to prepare a plan to address any shortcomings identified by the Step-2 evaluation. During Step 2 NASA will work with selected teams to tailor KDP B, including its scope, the gate products, and the timetable for their delivery. In the Step-1 proposal proposers should use their best judgment to scope the activities and associated budget for this tailored KDP B, with the mutual understanding among proposers and NASA that the final work package and its associated cost will not be known until the end of Step 2. This cost should be included as part of the AO cost cap. It is expected the tailored KDP B will be held within 6 months of the downselection.

Q-32 New Frontiers missions tend to be very long duration. A proposal may want to designate an alternate PI that will take over for the PI at some future date. Can the PI-designee's resume be 3-pages, consistent with the PI's??

Yes, although in such a case the qualifications and experience of the successor PI must be commensurate with the technical and managerial needs of the proposed investigation, just as with the original PI.

Q-33 The AO is clear (Requirement 93) that the PI-Managed Mission Cost shall include a \$22M launch service cost if a high-performance launch capability is required. However, we assume that the proposer is not required to carry reserves in the PIMMC for uncertainty on this NASA provided

element of cost. Please clarify that this \$22M cost is not to be included in the reserve calculation relative to meeting the minimum 25% requirement.

Proposers should not add margin onto the additional costs for launch services given in Table 3 or the RPS costs to proposers given in Table 5.

Q-34 For NF4, the NSPIRES cover page asks if proposal team members are employees of the U.S. Government, and if so the total dollar amount requested for that person. Is it necessary to answer this question since the information is contained within the cost section of the proposal?

Yes, this information is required as part of the cover sheet.

Q-35 Are Letters of Commitment (LOCs) from USA science Co-Investigators (Co-Is) needed if they are not contributing any hardware to the mission (i.e., if they are only science Co-Is)? Does NASA require LOCs from non-USA science Co-Is who are not providing hardware because their support (participation in team meetings, science analysis, etc.) represents a “contribution” as defined in Section 5.8.1.3?

As stated in Section 5.8.1.3 of the AO, personal letters of commitment are not required for Step-1 proposals, but all individuals must indicate his/her commitment through NSPIRES. *It is absolutely critical that proposal team members verify that their linked organization in NSPIRES is correct prior to providing this commitment.*

Institutional LOCs are required in Step-1 proposals under certain circumstances. Per Section 5.8.1 of the AO, a LOC signed by an institutional official must be provided from (i) all organizations offering contributions of goods and/or services (both U.S. and non-U.S.) on a no-exchange-of-funds basis and (ii) all major organizational partners in the proposal regardless of source of funding. Science Co-Is contributing time (i.e., salary) at no cost to NASA is considered a good and/or service. Thus, if any science Co-I is contributing his or her salary then an institutional Letter of Commitment is required in the Step-1 proposal. The contents of such a letter are described in Section 5.8.1. Additional guidelines for proposals with non-U.S. participation are given in Section 5.7.2 of the AO.