

NASA Response to Draft AO Feedback

AMMOS

“Section 5.2.9 should be deleted and this information should be highlighted in to the Mission Operations and Communications Services document. Many ground/operations system solutions have been used for planetary and other NASA missions successfully and with reasonable cost and risk. There should be no forced requirement or expectation for a particular ground system solution, just as there is no expectation for a particular spacecraft solution or instrument solution.”

“Requirement 45 could be interpreted as providing an unfair advantage to one organization over all others. Organizations who do not use AMMOS will have to use page limited space to describe their ground system solution, and AMMOS users would not.”

“Requirement B75 and section J.15. We recommend the deletion of both of these. They could be inconsistent with the philosophy of PI missions, where the PI has the freedom to innovate without mandates by NASA to use specific solutions.”

NASA Response: NASA has invested in the development of AMMOS and offers the benefit of utilizing this existing and proven operating system to all proposers. NASA’s sustained investment allows the further benefit of offering this utilization at no cost to users unless mission-unique adaptations are needed. As stated in the AO, the use of applicable AMMOS tools is expected, although not required, and proposers are free to describe in the proposal (and develop under the Cost Cap) whatever tools they feel are most suitable.

“Requirement 45 seems inconsistent with the previous text. It implies that if AMMOS is proposed, then its use need not be described nor budgeted in the proposal. However, the previous paragraph explicitly states that mission unique adaptations of AMMOS must be budgeted.”

NASA Response: The AO text was reworded to make it clear that only mission-unique adaptations to AMMOS and/or ground/operations system solution other than the AMMOS need to be described and budgeted.

Communications

“Requirement 36, demonstrating efficient use of NASA assets. Proposers lack the insight into the operations of NASA assets to fully assess whether their use is efficient or not. We recommend deleting this requirement or changing it so that that proposers demonstrate how the use of NASA assets meet the mission requirements.”

NASA Response: No change is provided to this requirement. Proposers should clearly describe the need and rationale for the use of NASA’s assets while remaining cognizant that there are a variety of other mission users of these assets.

“Requirement 37. We recommend deleting this – it appears to be a duplicate of requirement 35 but lacks the exclusion for DSN aperture fees.”

NASA Response: Requirement 37 was deleted and subsequent requirements renumbered.

“Per the draft AO: ‘proposed investigations are required to baseline the use of Ka-band for science data return, unless it is inappropriate.’ What is the threshold for ‘inappropriate?’ Follow on example - If an X-band downlink system meets the maximum bandwidth limitation of 12 Mhz, and appropriate justification can be provided in terms of mass, power and S/C pointing penalties relative to Ka-band, confirm X-band use for science data and TT&C will be accepted for use through at least 2038.”

NASA Response: NASA has no preconceived definition of “inappropriate” and allows the proposer the flexibility to justify alternative communications approaches.

Contributions

“Regarding the value of foreign instrument contributions constraint. The draft AO limits the value of foreign contributions in WBS 4/5 to one-third of the PI-Managed WBS 4/5 Cost. For a sample return mission where the analytical work is done on samples after they are returned to Earth instead of on the surface of the sampled object or in space, the spacecraft instrument suite may be minimal, in which case, any significant foreign contribution can represent a challenge with respect to this constraint. This constraint unfairly affects sample return missions where the mission does not involve in-situ sample analysis. These sample return missions dedicate the funds that competing missions apply towards WBS 4/5 instruments instead to WBS 6 elements that are only found on sample return missions (such as ascent vehicles or SRC’s or other engineering hardware) but are not included in the WBS 4/5 total. I ask that you consider modifying this constraint.

Recommend NASA either eliminate the constraint on WBS 4/5 for sample return missions, or modify this constraint to include in the equation those spacecraft components that are specific to the return of samples (since the samples are key to the science) that would not otherwise be sent on an in-situ or remote-sensing mission. Alternatively, consider a simpler absolute limit rather than a fractional limit, for example, “the value of foreign contributions in WBS 4 & 5 must be less than \$30 million” or whatever number makes sense. The constraint on contributions to the total mission would remain in place.”

NASA Response: The feedback above incompletely states the AO policy on contributions. The policy is composed of two parts: first, that “the sum of contributions of any kind to the entirety of the investigation is not to exceed one-third (1/3) of the proposed PI-Managed Mission Cost,” and second, that “Additionally, non-NASA contributions to the science instruments are not to exceed one-third (1/3) of the PI-Managed Instrument Cost. The ‘PI-Managed Instrument Cost’ is defined as the sum of the costs assigned to elements 4.0 (Science) and 5.0 (Payload(s)) in the standard Work Breakdown Structure. See NPR 7120.5E and references therein.”

The policy on international contributions is unchanged. Proposers are free to assign elements to the WBS structure per the strategy described in the proposal (e.g., per the best practices of the lead implementing institution).

Cost

“Removing Phase E-F costs from the cap is good for Discovery, because it helps ‘level the playing field’ for outer planet missions. However, for New Frontiers there is the unintended consequence: \$850M A-D is not equivalent to \$1B A-F for two of the six themes: Lunar South Pole Aitken-Basin Sample Return and Venus In Situ Explorer. Although both have very short Phase E compared to the others, both are nonetheless complex missions that require multiple flight elements to meet the Decadal science objectives. Under the terms of the Draft AO, they cannot take full advantage of the Decadal’s intended resources (i.e., by balancing the resources available to the other four themes across all of Phases A-F). It is unfair. Request: For New Frontiers only, adopt the Decadal-recommended PIMMC cap of \$1B FY15 for Phases A-E, not including LV.”

NASA Response: NASA sets the cost cap based on a variety of factors. While the recommendation of the Decadal Survey is an important factor, it is not the only important factor.

“The foreword to the AO states the cost cap in \$FY15. We assume that is a typo and it should say FY17. Please confirm.”

NASA Response: The statement of FY2015\$ is correct.

Curation

“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.”

NASA Response: The AO is 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. This will be covered in a Q&A to formally add it to the AO process.

“Is there any requirement or policy regarding the fraction of returned sample that must remain at the close of preliminary examination? If there is such a fraction, can this include samples transferred to foreign partners, or would this percentage be in addition to such transferred samples? It's not entirely clear where the foreign sample transfers come out of - the general sample or the 25% set aside for PE.”

“In regards to calculating the percentage of a returned sample that can be permanently transferred to a foreign partner, how is their contribution calculated (percentage of the science payload costs, or what)? If we go purely by foreign contributions in terms of money and count the cost of everything (hardware, science support, etc.), the foreign contributions may be at a low percentage level (e.g., 1%), but giving them such a small fraction of the sample is unlikely to allow for a viable scientific program to study the transferred samples. For a transfer to make scientific sense, we'd have to provide a larger fraction of the sample, either by doing so solely for scientific reasons or by scaling the contributions against a portion of the mission budget (for example, against the science budget, not the entire mission budget).”

NASA Response: Text was added to the final AO in Sections 5.1.5.2, 5.1.5.3, and J.6b to address these comments.

Heritage

“While a 30-page limit for SMEX and MIDEX is reasonable, New Frontiers missions are significantly more costly and complex than SMEX or MIDEX, and heritage is correspondingly more important. I suggest, then, that a limit greater than 30 pages is appropriate for New Frontiers, so that proposing teams are able to describe the heritage in their systems in adequate detail.”

“30 pages is insufficient for the heritage appendix for NF sized missions – this is the same new limit much smaller mission scope AOs have, for example Mission of Opportunities and SMEX AOs, which can have less than one-tenth the cost cap and complexity. Consider an increase of the page limit to 80 to 90 pages or at a minimum create some defensible link to hardware and mission complexity.”

NASA Response: Heritage holds great importance regardless of mission size. While the complexity of New Frontiers class missions may lead to a larger number of heritage technologies, the intent of this page limit is to reduce the workload on both proposers and reviewers and set expectations at an appropriate level for a Step-1 proposal.

Launch Vehicles

“The capabilities of the categories of launch vehicles are not very clear.”

NASA Response: The performance capabilities of the launch vehicle classes are shown in the “ELV Launch Services Information Summary” document posted in the Program Library.

“Please consider clarifying Table 1 on page 27 of the draft AO. It is not clear if every mission must budget at least \$100 K for launch approval, even if their A2 mission multiple is zero.”

NASA Response: This information is covered in the AO and in NPR 8715.3C.

“Page B-31 describes what to do if a non-NASA launch service is proposed. Will this be allowed? Will SLS be allowed?”

“Throughout, do we need to specify it is a commercial launch service procured through LSP and not a SLS LV? Both are NASA but LSP does not provide services for SLS.”

NASA Response: Non-NASA launch services are not allowed under this AO. Per Section 5.9.2, standard launch services utilizing a domestic expendable launch vehicle will be provided by NASA as GFE. NASA does not offer specific launch vehicles but instead offers performance classes suitable for missions. Four classes of performance are shown in the “ELV Launch Services Program Information Summary” document in the Program Library, and proposers must specify which capability is needed for their investigation.

There were several comments about the performance curves shown in the first draft of the “ELV Launch Services Program Information Summary” document in the Program Library not meeting the expectations of proposers. These comments sometimes revealed what could be considered competition sensitive material and are not repeated here.

NASA Response: The performance plots shown in the “ELV Launch Services Program Information Summary” document in the Program Library were reworked in response to the community’s feedback.

“... if NASA intends to solicit outer solar system missions and have a PI-managed cost cap of \$850 million, it would be more appropriate to incentivize teams for using low performance vehicles with small fairings than penalize them for using the high performance vehicles with large fairings that are necessary to meet most of the aims of the AO.”

“In addition, in the past the expectation would be medium performance to be funded by NASA and the low performance to be incentivized, and a much lower cost for the high performance. This is an approach which impacts previous work and return on investment.”

“Make the teams demonstrate (low/mid/high) end Launch Vehicle need (and accompanying trajectories) but remove the cost benefit/surcharge associated with launch vehicle selection.”

“The cost penalties for use of higher-performing launch vehicles place outer solar system missions at a distinct disadvantage in this AO. In the interest of fair competition, we strongly recommend that the launch service cost determination follow the pattern used in prior New Frontiers AOs: Set the baseline (zero delta cost) at the highest performing LV, rather than the lowest, and give cost cap credit to proposals that are able to use lower-performing LVs. This will help to ensure that otherwise viable outer solar system missions are not pushed over the cost cap due to the LV cost penalty.”

NASA Response: It is not NASA’s intent in the New Frontiers 4 AO to incentivize or disincentivize exploration of any portion of the solar system over any other. Instead, the AO passes a portion of the higher costs to NASA for non-standard launch services (e.g., nuclear materials, higher performance launch vehicles, larger fairings) to proposers requiring these services.

“The cost impact for a move from a 4-m to 5-m fairing is noticeably higher than in the recent Discovery 2014 AO, and appears high compared to emerging launch vehicle options that may be available in the timeframe of this AO. Constraining spacecraft designs to fit within a smaller volume than necessary can increase mission cost and/or technical risk. Is NASA considering changing the cost adjustment for use of a 5-meter fairing when the final AO is released?”

“We recommend the 5M fairing penalty be greatly reduced and potential impacts considered before finalizing the AO.”

NASA Response: The AO documents the final costs to proposers for non-standard launch services. Again, NASA passes only a portion of the additional costs of non-standard launch services to proposers. As stated in the fourth community announcement, the costs of both families of launch vehicles (4m and 5m) are projected for a December 2024 launch date based upon contract data, projected future state of the industry, historical trends, and historical actuals. The Discovery 2014 AO pricing was for an earlier launch date, which is why the cost for that AO was slightly lower than for the New Frontiers AO

“Additionally, the cost schedule in Table 3 cannot be taken as FINAL. Both performance and cost significantly drive fundamental scope decisions that cannot be deferred until the Final AO is released in Dec-Jan. Request: Please post, no later than end of September, 1) quantified LV performance range curves (launch mass vs. C3) for the low, medium, and high-performance categories; and 2) FINAL Table 3 costs.”

NASA Response: An update to the draft “ELV Launch Services Program Information Summary” document in the Program Library was posted as part of the Fourth Community Announcement.

There were several comments requesting clarifications of the dimensions of the 4 and 5 m fairings shown in the first draft of the “ELV Launch Services Program Information Summary” document in the Program Library. These comments sometimes revealed what could be considered competition sensitive material and are not repeated here.

NASA Response: The dimensions given for the performance plots shown in the “ELV Launch Services Program Information Summary” document in the Program Library were revised and corrected in response to the community’s feedback.

Nuclear Materials

“We strongly recommend that NASA provide proposal teams with a technical point of contact for MMRTG integration immediately upon release of the final AO. It is essential, as proven during the Discovery 2010 AO cycle, to have a consistent technical interface and information that enables organizations to submit an implementable design through TMC, and to ensure that system-level cost and schedule impacts are captured accurately.”

NASA Response: A technical point of contact has been added to the AO.

Proposal Structure and AO Language

“Req B-4: Use of the word ‘additional’ is incorrect: additional to what baseline? In Discovery 2014, the clarified requirement clearly provided two extra pages for EACH instrument and EACH flight element, avoiding ambiguity. In the total page maximum, ‘Science section’ should be ‘Sections D + E’ and ‘Mission Implementation section’ should be ‘Sections F + G.’”

“The instructions for use of extra pages are inconsistent. The footnote to the Page Limit table says extra pages may be used as desired in sections D-G, but Requirement B-4 states that extra instrument pages must be used in sections D-E and extra flight system pages must be used in F-G. Please clarify the expectations. NASA has done it both ways in past AOs so clarification is required.”

NASA Response: The Proposal Structure and Page Limits table in Appendix B was clarified.

“In the proposal outline specified by Appendix B, section E.2 Data Sufficiency (requirement B 21) is out of order: it should not precede section E.3 Science Mission Profile (requirement B 22). In Discovery 2014, the sections were ordered differently for Step 2, via the CSR guidelines. Request: The most logical ‘storytelling’ sequence of sections would be:

- Instrumentation
- Science Mission Profile
- Data Sufficiency.”

NASA Response: NASA thanks you for the suggestion. The NF4 AO is structured to match the newly revised standard AO as much as possible.

“Please update the New Frontiers Safety, Reliability, and Quality Assurance Plan to allow calibration of test and measurement equipment in accordance with ANSI Z540.1, ANSI Z540.3, or ISO 17025 in accordance with NPD 8730.1C With Change 2. Paragraph 5.3.2 of the New Frontiers Safety,

Reliability, and Quality Assurance Plan invokes ANSI Z540.3-2006 for calibration of measurement equipment. The requirement as stated in the New Frontiers Safety, Reliability, and Quality Assurance Plan seems to be based on a previous NPD that was recently revised. The revision to NPD 8730.1C With Change 2 was released in May 2016 after the New Frontiers plan was signed in February 2016.”

NASA Response: This has been noted and will be dealt with in the next update of the New Frontiers Safety, Reliability, and Quality Assurance Plan.

“Requirement B-14 states that the flight system discussion should include ‘Launch Mass not available to the proposed mission.’ Please clarify what this means and what the mass would be used for.”

NASA Response: This refers to Requirement B-34 in Appendix, and the text “Launch Mass not available to the proposed mission” refers to co-manifested investigations. This portion of the requirement is intended to avoid situations where proposers may mistakenly claim margin not available to the proposed investigation because of the presence of the co-manifested investigation.

“Regarding Appendix J7 - Please clarify whether Proposal Appendix J.7 ‘Discussion of Limiting the Generation of Orbital Debris and End of Mission Spacecraft Disposal Requirements’ is required, or not. It is described as required in Appendix B. However, Requirement 43 states ‘This requirement has been deferred to Step 2.’ If required, how does Appendix J.7 apply to sample return missions?”

NASA Response: Appendix B has been updated to match the requirement in the body of the proposal indicating that this has been deferred to Step 2.

“Can the time period for final generation of data products be extended? Page 16 of the draft AO states that the period for final generation and delivery of data products is no more than 6 months after end of operations.”

NASA Response: As stated in the AO, data product latency may not exceed six months except under exceptional circumstances. Proposers are free to make an argument for such exceptional circumstances. Any such argument will be intensely evaluated.

“The AO pg 22 says that details of the required Engineering Science Investigation will be posted on the program library, but they are not there. Please tell us when those details will be posted so we can plan accordingly.”

NASA Response: This document has been posted in the Program Library.

Schedule

“We recommend somewhat later launch by dates might enable more efficient solutions. The investment is significant for New Frontiers, more launch by flexibility might be beneficial. The selection process does not always move as fast as planned, such issues could also benefit from some extension. (for example some Venus launch windows benefit from a small ~three month extension from the current date).”

NASA Response: The LRD was extended to 12/31/25 for all investigations.

“NF missions potentially have multiple flight systems and multiple instruments, and three schedule foldouts seems insufficient to provide the reviewers much insight. Instead we recommend a compromise, for example consider allowing 3 foldouts (Note - a one-page master schedule, an integration and test schedule, one extra page) plus an additional foldout for each unique flight system and a foldout for each unique instrument.”

NASA Response: NASA is endeavoring to resize both the workload and expectations to levels more reasonable for Step-1 proposals. Community feedback to the revision of the standard AO highlighted the trend toward increasingly detailed schedules in Step 1 as a primary area needing to be addressed. NASA is confident the existing page limits are adequate to provide the information necessary for a Step-1 evaluation of a New Frontiers mission while also reducing the workload for both the proposal and evaluation communities.

“Is the MS Project version of the schedule is to match that which is in the proposal (only 3 un-counted 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?”

NASA Response: 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.

“What specific version of MS Project should be used for submission of the electronic schedule file? Req. B-41”

NASA Response: MS project 2010 is preferred, and an MS Project file backward compatible the 2007 version is acceptable.

Technology

“Some incentive for Ultra/Mega/Advanced arrays would encourage their use and increase return for this AO and future ones. Their maturity of these arrays is higher but there is still potential for overly negative reactions to their use by reviewers. Even a simple reduced weakness exposure incentive would be useful for some NF missions and NASA.”

NASA Response: Ultraflex and Megaflex arrays are at TRL 6 and above and thus possess sufficient readiness and maturity without technology infusion.

“New Technologies are typically expected to be at TRL6 by PDR. By the end of FY18, prior to PDR, HEEET will be at TRL6 for a 1m heat shield and have a low-risk scale up for sizes >1m. Still, the year needed for fiber procurement and loom set up means that if we start fiber procurement right after down selection, a demonstration of HEEET at a larger scale may not be completed by PDR. Is this risk part of the risk of ‘developing 3D woven TPS on time,’ mentioned in Table 4, that will not impact proposal evaluation? We assume it is.”

NASA Response: As stated in the AO in Table 4 for HEEET, “Risk of developing 3D woven TPS on time will not impact proposal evaluation.”

“Regarding HEEET what is the scope of NASA GFE? The AO states ‘NASA pays for HEEET team consulting & technology transfer’? What time period does this cover? (Phase A? Phase B?) What is the anticipated level of this support?”

“Table 4 in the Draft AO states that NASA will provide team consulting & technology as GFE for HEEET. It is reasonable to believe that this applies to all NASA consulting and technology throughout the mission life cycle but that is not explicitly stated. Request: Please confirm that the NASA GFE for HEEET team consulting & technology (Table 4) covers NASA Center efforts throughout Phases B-F.”

NASA Response: As stated in Table 4, NASA will provide as GFE “NASA pays for HEEET team consulting & technology transfer.” A footnote was added to Table 4 stating “NASA support for HEEET team will extend through the lifetime of the mission.” Generally speaking, the scope of the consulting and technology transfer covers technical exchanges of information. Proposers are urged to contact the POC listed in the AO for further information.

“There is support required from NASA Glenn Research Center (GRC), the lead center in developing NEXT, that would be provided if the systems are GFE, but will not be provided with a procurement from a vendor (Aerojet Rocketdyne). We recommend there be support that is not part of the PIMMC as part of the incentive. What GRC assistance (technical expertise, support equipment, documentation) will be provided to a winning proposer that is not part of the PIMMC?”

NASA Response: The intent of the NEXT incentive in part is to help establish the transfer of the technology to a commercial vendor. Proposers may use a portion of the financial incentive to support GRC-based technical assistance as desired. Proposers are urged to contact the POC listed in the AO for further information.

“In addition to the offered technologies, it would be advantageous to NASA and the community if there were an ‘open’ call for technologies that would allow the proposers to propose against an additional cap for the development and flight of new technologies. Such a cap should be at least a few million dollars and could be usefully as much as \$10-20M although items at the high end of that range would have to offer a truly compelling case for the return on investment. Proposers could use such funding for a range of activities resulting in flight of a technological item which otherwise would not pass TMCO review. Funded activities could cover a range of activities e.g. 1) carrying a new item for development in parallel with a heritage baseline item and then inserted into the baseline to replace the heritage item when the risks had been mitigated, or 2) to developing and flying a redundant component that could be operated in parallel or switched in or 3) carrying a small demonstration component.”

NASA Response: NASA is open to ideas such as this as a Technology Demonstration Option, which is deferred until Step 2 for this AO. This feedback will be considered when NASA finalizes the parameters for the Step-2 Concept Study Report.