

# Heliophysics Explorers Program 2019 Medium-Class Explorer (MIDEX) Step-1 Questions & Answers

<b>Change Log</b>		
<b>Rev.</b>	<b>Date</b>	<b>Description of Changes</b>
01	06/07/2019	Added Q&As 1-21
02	06/28/2019	Added Q&As 22-26
03	07/09/2019	Added Q&A 27
04	07/22/2019	Added Q&As 28 and 29
05	08/06/2019	Updated Q&As 19 and 28 / Added Q&As 30-47 from the Pre-Proposal Conference
06	09/19/2019	Added Q&As 48-52

**Q-1 When will the *LV Launch Services Information Summary* document be made available?**

The target for release is mid-June 2019.

**Q-2 What are the specific expectations for technical budgets that will be used in the evaluation of contingencies, margins, and reserves?**

Expectations will be a function of the proposed investigation. For example, simply meeting the AO-required minimum unencumbered cost reserves of 25% against the cost to complete Phases B/C/D will not be considered sufficient in the case of a low-maturity design.

**Q-3 Are the Planetary Protection requirements only applicable to investigations that target other solar system bodies?**

The requirements also apply to investigations that include sample return.

**Q-4 Will mission-unique upper stages be provided as options for AO-provided launch vehicles?**

No.

**Q-5 Are there any specific launch services technical oversight requirements for PI-provided upper stages on the Launch Vehicle stack?**

No. Any such stages will be considered part of the spacecraft bus, for the purposes of evaluation. Note, however, that the ability of the proposal team to oversee the procurement and integration of the upper stage—including any applicable launch vehicle qualification—will be evaluated.

**Q-6 Do PI-provided upper stages qualify for extra pages, due to being additional flight elements?**

No, since the expended stages serve no function after separation from the spacecraft bus.

**Q-7 Please confirm that NEN and SN costs are to be included in the PI-Managed Mission Cost.**

Confirmed.

**Q-8 Although details are deferred until Step 2, will any proposal discussion of the capability to implement Space Systems Protection per AO Section 5.2.11 be used in the Step-1 evaluation, positively, negatively, or at all?**

All material provided in proposals is evaluated, although non-evaluative items (e.g., programmatic concerns) may result in comments to the Selection Official rather than findings. The same holds true for all deferred requirements.

**Q-9 Please distinguish between an Advanced Engineering Development and a New Technology Development, identifying the metrics needed to demonstrate maturity levels within an Advanced Engineering Development.**

The TRL of a system is not solely a matter of new technologies. Often engineering considerations will dictate the TRL of a system, and the process by which it can be raised. For example the second step in Figure G.4-2 “TMA [Technology Maturity Assessment] Thought Process” of NASA/SP-2016-6105 Rev 2, *NASA Systems Engineering Handbook* states:

Has an identical unit in a different configuration/system architecture been successful operated in space or the target environment or launched? *If so, then this initially drops to TRL 5 until differences are evaluated.*

It should be noted that TRL is not in and of itself an indicator of the level of effort required to develop an item for flight. It is simply a trigger for the AO requirement to include a plan for system maturation to TRL 6 by no later than PDR and a backup plan in the event that the proposed systems cannot be matured as planned. Advancement Degree of Difficulty Assessment (AD<sup>2</sup>) can be a more significant consideration—one that is addressed by definition in the a plan for system maturation.

**Q-10 Section 5.1.6 Science Enhancement Options states “[f]light hardware may not be proposed as SEOs”. Could flight hardware provided through a foreign contribution be proposed as an SEO?**

No.

**Q-11 Citizen Science is a very promising area across SMD and seems particularly well suited to heliophysics missions. Could Citizen Science fall under SC and/or SEO? Alternatively, given that Citizen Science is now encouraged per SPD-33, with mention of incentives that may be provided for PI-led missions, is it anticipated that there will be dedicated incentives offered in the future?**

Student Collaboration is limited to “current or future undergraduate or graduate students, including advanced high schoolers”, per SPD-31 (available in the Program Library). While Citizen Science can be part of an SEO, the focus of the evaluation of the SEO will not be altered. The possibility of the future addition of a specific incentive for Citizen Science and associated evaluation criteria cannot be addressed at this time.

**Q-12 Does NASA consider race, national origin, and age to be “diversity factors”? How is NASA intending to evaluate the team diversity of various proposals?**

While there are no specific evaluation criteria for team diversity, NASA Science cares about all dimensions of diversity across our entire portfolio. Diversity will not be specifically evaluated in Step 1.

**Q-13 Solar wind measurements are crucial to many heliophysics investigation concepts. NASA has recently indicated that proposals can assume solar wind monitoring data will be available in the future, however the DRAFT AO makes no mention of this availability, potentially leading to weaknesses for such proposals. Can solar wind data availability be clarified in the final AO?**

The final AO will include a statement that proposers may assume solar wind monitoring data will be available.

**Q-14 Given the importance of evaluating a schedule as a tool to assess mission feasibility, we suggest that the submission of a Microsoft Project file be required, as has been the case in previous AOs with similar or higher AO Cost Caps.**

The requirement will be added to the final AO.

**Q-15 Page B-16 of the DRAFT AO states “[a] project schedule foldout(s) covering all phases of the investigation shall be provided to at least WBS level 3...”, but on page 37 and B-19 the AO states that the WBS only needs to go to Level 2. This seems to be an internal inconsistency that should be addressed.**

The WBS levels have been specified to address the requirements for schedule and cost analyses respectively, and will not be changed.

**Q-16 *Space Communications and Navigation (SCaN) Mission Operations and Communications Services (MOCS)* in the Program Library refers to <http://esc.gsfc.nasa.gov/assets/files/453-UG-002905%282%29.pdf> but the link is empty. The previous NEN User’s Guide describes no Ka-band ground station besides White Sands, which is problematic in light of the AO’s requirement for the use of Ka-band. Can an updated NEN User’s Guide be made available, or at least a list of ground stations with quantified capabilities provided?**

The latest Near Earth Network (NEN) Users’ Guide (Revision 4) has been uploaded to the Program Library. Ka-band is being added to Alaska and Chile stations.

**Q-17 The reference in the *SCaN MOCS* for the “most recent rates” for NEN is a document dating from October 2015. Those for SN date from October 2016. Is there any more recent information proposers should use?**

The updated NEN rate memo is pending but until it is released, proposers should use \$430/pass for NEN Stations for FY19. The October 2016 SN rates remain applicable for this opportunity.

**Q-18 In the *SCaNMOCS*, Section 2.3, line item number 8 states “8) LDPC Rate 7/8 (Note: This service has been partially implemented and is not yet available across the SCaN networks)”. Does this mean that missions cannot propose LDPC 7/8 because it’s not available yet (and won’t be in time to support these missions, which will launch in 2024)? If missions want to use LDPC 7/8, how should proposers coordinate, and will there be a cost implication to investigations?**

7/8 codes are covered in the NEN Users’ Guide and can be “activated” in almost all stations as needed. Contact Jerry Mason (NIMO Office Chief) <[jerry.l.mason@nasa.gov](mailto:jerry.l.mason@nasa.gov)> for more information.

**Q-19 Given that the payload Class C (per NPR 8705.4) designation for MIDEX investigations, if an investigation involves more than one observatory, does *each* observatory need to be Class C?**

No, the designation applies at the deployed investigation level. This is in-line with the NPR 8705.4 allowance for lower Class designations for sub-elements:

Any equipment that constitutes a payload, or part of a payload, may be separately classified. For example, a Class A satellite may incorporate multiple instruments individually classified A through D.

Note that proposers of constellations are highly encouraged to provide reliability assessments demonstrating the probability of meeting the mission lifetime requirements for both the Baseline and Threshold Science Missions. Also, particular attention should be paid to the possibility of *system[ati]c* issues arising in the design of lower Class observatories.

**Q-20 Is there a CubeSat-specific parametric cost model being used for the evaluation?**

While CubeSat-specific cost models will not be utilized, at least one will utilize a bottoms-up methodology. Investigations that challenge existing costing relationships should include supporting data, such as the limitations of specific cost models.

**Q-21 We plan to include a dedicated ground-based observatory as a critical, funded part of our investigation; we consider it one of our “instruments”. Is this acceptable?**

Yes, although the magnitude of investment in any such observatory may be a consideration in selection.

**Q-22 Has the POC for the Gateway changed from the DRAFT AO?**

Yes, please contact Jason E. Jenkins, Program Executive for Exploration Science Mission Directorate, NASA Headquarters, 300 E St SW, Washington DC, 20546; Tel: (202) 358-1755; email: [jason.e.jenkins@nasa.gov](mailto:jason.e.jenkins@nasa.gov). Also, a Letter of Gateway Technical Interface and

Resource Accommodation Feasibility Assessment from the NASA Gateway Integration Office will not be required.

**Q-23 How will Gateway interface and accommodation assessments be evaluated given that details on Gateway continue to evolve (Section 5.9.2.4)?**

Because the Gateway interface is still evolving, the proposed interface and accommodation will not be evaluated. Instead, comments on the proposed Gateway interface and accommodation will be provided to an accommodation study team that will in turn provide comments to the Selection Official.

**Q-24 When must a Gateway payload be delivered for integration, in order to meet the AO-required launch readiness date of February 2026?**

Proposers should assume that Gateway payloads must be delivered 6 months ahead of the AO-required launch readiness date. This requirement may be updated for the Phase A study. For a Gateway payload, investigation costs during any potential gap between delivery and the start of integration to the designated launch vehicle will be outside the PI-Managed Mission Cost. Proposers will be required to estimate costs to minimally support the investigation during a gap between delivery and the start of integration.

**Q-25 In APPENDIX C of the DRAFT AO, “AO Cost Cap” and “Adjusted AO Cost Cap” are defined as being limited to Phases A–D. However, “PI-Managed Mission Cost” is defined as covering Phases A–F in APPENDIX C and the balance of the AO. Is it correct to assume that the AO Cost Cap of \$250M is for Phases A–F?**

Yes. The final AO will remove both instances of “Phases A–D portion of”.

**Q-26 With regards to the deferred RY\$ requirements, do proposals need to reserve dollars under the AO Cost Cap or Adjusted AO Cost Cap—as applicable—to address escalation of FY\$ in Phase A concept studies?**

No. The AO Cost Cap and Adjusted AO Cost Cap are specified in terms of FY2019\$. It is understood that escalation of costs in Phase A concept studies may result in the PI-Managed Mission Cost—specified in terms of RY\$—exceeding the FY2019\$-based values in the AO. Note that the version of the NASA New Start Inflation Index applicable to the final AO was released after the DRAFT AO was published.

**Q-27 As mission-unique upper stages for AO-provided launch vehicles are not options (Q&A 4), are there other ways of increasing the performance capability of a scenario from that in Attachment 1 of the *Launch Services Program Information Summary*?**

Potentially. Contact the POC in the *Launch Services Program Information Summary* for possible options.

**Q-28 Please consider re-examining the specific restriction in the AO regarding The Aerospace Corporation involvement. Proposing teams had incorporated the institution based on the assertion in the DRAFT AO that there was no limitation on its participation.**

The DRAFT AO language—indicating that there is no limitation on the participation of The Aerospace Corporation in any capacity under this AO—will be re-instated in an amendment to the AO. Therefore, there is no longer a limitation on the participation of Aerospace in any capacity under the AO.

[AO Amendment #1 was necessary because the DRAFT AO provided no indication of an impending limitation on participation by Aerospace. The amendment does not set a precedent for future AOs or Program Element Appendices to the Third Stand-Alone Missions of Opportunity Notice (SALMON-3). ~~Note, however, that the policy is reversed only for this AO because the timing of the DRAFT AO and final AO straddled the policy decision/implementation point. In the broader context of the full range of activities identified in the NASA contract with Aerospace, it is anticipated that future SMD AOs will restrict participation of Aerospace in those AOs.]~~

**Q-29 The updated Launch Services Program Information Summary posted on July 22 added another scenario. Are proposers required to discuss compatibility with the launch vehicle characteristics and capabilities of all three scenarios?**

Yes. What had been Scenario 2 has been expanded into Scenario 2 and Scenario 3, to provide more options for performance and shroud size. Note that as the environments remain the same for the new Scenario 2 and Scenario 3, the only additional tasks will be addressing separate performances levels and shroud sizes.

**Q-30 What are the specific requirements that were deferred in AO Section 5.2.11 *Space Systems Protection*?**

The requirements are in the DRAFT *Guidelines and Criteria for the Phase A Concept Study* in the Program Library:

Requirement CS-104. Provide the detailed plans, as applicable, addressing the protection of uplink commands using approaches compliant with FIPS 140-2 Level 1.

Requirement CS-105. Provide the detailed plans addressing the ability of command uplink, position, navigation, and timing subsystems to recognize and survive interference.

Requirement CS-106. Provide the detailed plans addressing the protection of command uplink information at no less than the Sensitive But Unclassified level.

**Q-31 Is the approximately \$5M incentive for TDO(s) per proposed TDO?**

The TDO(s) incentive will be limited to the value definitized at the beginning of Step 2, regardless of whether an investigation proposes one or more TDOs.

**Q-32 There is an inconsistency in the Pre-Proposal Conference slides regarding whether a Type 5 Clarification response may reference materials outside of the proposal. Please clarify.**

Type 5 responses will be limited to materials inside the proposal; this will be reflected in the Evaluation Plan and Clarification instructions.

**Q-33 Please provide clarification on what mission-unique launch services are provided at no cost and what must be included in the PI-Managed Mission Cost. For the latter, will LSP provide guidance for the level of unencumbered cost reserves?**

Attachment 2 of the *Launch Services Program Information Summary* provides a list of “Baseline Mission-Unique Services” that are provided at no cost. Contact the LSP POC listed in the document for additional details, as well as the costs and recommended levels of unencumbered cost reserves for those mission-unique services that are not included.

**Q-34 Regarding AO Section 4.2.5 NASA Concurrence for Change(s) of Named Key Management Team Members or Co-Is, is “[s]ubsequent to selection” after Step 1 or Step 2? From whom should concurrence be sought?**

After Step 1. Concurrence requests should be sent to the individual specified in AO Section 6.1.5 *Point of Contact for Further Information* (Dr. J. Daniel Moses for this opportunity).

**Q-35 If a classified technology sponsor is participating in a proposal, does that preclude the use of any of the options to support heritage claims from classified programs?**

No, it would only preclude the option in AO Section 5.8.4.3 Sponsor Verification.

**Q-36 Do Notices of Intent require an indication that a classified appendix will be provided?**

The NOI form has radio buttons for the provision of a classified appendix, but one option is “Not yet known”.

**Q-37 Can the names of the cost models used for operations estimates be provided?**

No.

**Q-38 Why have cost actuals not been accepted by TMC in previous evaluations?**

While specific cases may involve other considerations, TMC cost validation is performed using parametric models, and the proposed actuals would have had to be outside of the evaluation-specific error bound for the WBS element(s) flagged. Because the proposed positions (e.g., TRL levels) are used to drive the TMC cost validation, there is typically little that can be done to adjust the impact, although the TMC Panel will attempt to determine whether bookkeeping differences play a role. However, a convincing case of the validity of the proposed cost *could* be reflected by way of a reduction in any attendant cost threat's likelihood.

**Q-39 Slide 17 of the TMC presentation includes, under “Inherent Risks”, items that have been evaluated, such as “[t]echnologies or technology extensions”.**

The TMC Panel does not evaluate the inherent risks of any particular environment or development. It evaluates the proposing team's plans for addressing those risks. For example, whether the development plan for a new technology is likely to result in its successful flight. The greater the inherent risk, the more depth is expected in the discussion of the associated implementation.

**Q-40 How will the cost error bound for investigations that are very different from past missions be determined?**

Cost error bounds are established using a historical set of missions that are representative of the opportunity. It is acknowledged that a new investigation approach may result in costs that are significantly below the norm, triggering a TMC validation finding. Although not strictly required, proposers in this situation are highly encouraged to perform their own validations as part of their Basis of Estimate, and to justify any significant departures.

**Q-41 The performance curves in Attachment 1 of the *Launch Services Program Information Summary* end at C3 values that are not sufficient for some investigations. Are values allowed beyond those presented?**

Yes, please work with the LSP POC to determine whether your C3 requirement can be accommodated.

**Q-42 What is considered a Standard Payload Adapter?**

The *Launch Services Program Information Summary* Performance Ground Rules state “[a]ssumes a 47-inch (1194 mm) separation system”, which represents the 1194 mm as the standard adapter. Note that the Performance Ground Rules are common to all three Scenarios; the intention was to only provide them once, but the expansion of Scenario 2 into Scenarios 2 and 3 resulted in their repetition. Please contact the LSP POC for the costs and impacts of any Custom Payload Adaptor

**Q-43 What can we assume is the usable volume available under the plane of the separation system with a Standard Payload Adapter? How would a Custom Payload**

**Adapter affect the volumes specified in *Launch Services Program Information Summary*?**

Please contact the LSP POC for specific volume-related questions. Note that if the LSP POC feels that any request is generally applicable, the material will be published in this document.

**Q-44 Can all three Scenarios be launched from Vandenberg?**

Not all of these vehicles that are under consideration can be launched from Vandenberg. Moreover, launch site is not typically a requirement specified in the Launch Services Task Order. Contact the LSP POC for details.

**Q-45 Q&A 17 provides a \$430/pass FY19 cost for NEN stations. Are these to be included in the PI-Managed Mission Cost?**

Yes.

**Q-46 Can more detail be provided about what specific locations are available for payloads on the Gateway? How can proposals for accommodation on the Gateway be developed when the interfaces are not known?**

Unfortunately they have not been determined.

**Q-47 How will TMC evaluate Gateway proposals without a better definition of the Gateway itself?**

While TMC evaluation standards will not differ for Gateway proposals, the lack of definition of the Gateway will necessarily result in more benefit of the doubt given to the proposer, compared to platforms with long-established interfaces. While this may not preclude a High Risk from being assessed, utilization of the Gateway is recognized by SMD as representing a high-risk/high-reward proposition.

**Q-48 Are foreign instrument contributions allowed to fulfill a critical role?**

Mission-critical contributions are not forbidden, however proposers should carefully consider the various sections of the AO that apply to both contribution limits and risk assessment, including, but not limited to: 5.3.6 Risk Management, 5.6.7 Contributions, 5.7 Non-U.S. Participation Requirements, and 7.3 Selection Factors. If the foreign instrument contribution is critical, carefully review Section 5.6.7 and be sure that it is consistent with all of the limitations specified, including but not limited to: 1) the sum of contributions of any kind to the entirety of the investigation is not to exceed one-third of the proposed PI-Managed Mission Cost, 2) the proposed contribution is consistent with SMD's policy that the contribution does not exceed approximately one-third of the science payload, and 3) explain how the programmatic risks associated with the contribution will be handled.

**Q-49 NEN UG Rev 4 still provides no data on Ka-band capabilities at any station other than White Sands. It states capability is being added, but without details. For users wishing to propose Ka band, can a list of Ka stations and corresponding technical data be provided (G/T, availability statistics, modulation, data rates, polarizations, etc.)? Proposers need some data to properly size (and price) RF links for the proposal.**

Technical data on NEN-offered Ka-band antennas is provided in the 2019 Heliophysics MIDEX Program Library, under [Program Specific Documents](#) item 22, as 22\_NIKA\_Table\_2-1\_Additions.xlsx. There is no additional per-pass cost for any of the antennas listed. Additionally, the maximum data rate at Ka-band is 3.6 Gbps; Ka-band modulations supported include OQPSK (SQPSK), QPSK, BPSK, and 8PSK; Ka-band codings supported include NRZ-L, NRZ-M, NRZ-S, Bi-phase Level, Bi-Phase Mark, Bi-Phase Space, Unencoded, Convolution Coding, Reed-Solomon, Reed-Solomon with Convolution, and LDPC 7/8; and Ka-band polarizations supported include RHCP and LHCP simultaneously.

**Q-50 There are commercial providers that have already installed Ka sites at various polar locations. Antenna data is available for those stations. In absence of data provided by NASA, should proposers assume commercial ground station usage, outside of NEN?**

Commercial telecommunications capabilities are not prohibited.

**Q-51 From commercial providers, there is a range of antennas installed/planned, with G/T ranging from 31 to 35 dB, with 41 dB antennas planned in the future. Will NASA own/lease any of those antennas and can proposers assume they are available for 2019 Heliophysics MIDEX investigations?**

Ka-band antennas offered by NEN for the 2019 Heliophysics Explorers opportunity are limited to those in 22\_NIKA\_Table\_2-1\_Additions.xlsx.

**Q-52 Will the per-pass cost include moving data to user operations centers, even for KSAT and Punta Arenas antennas in 22\_NIKA\_Table\_2-1\_Additions.xlsx?**

Yes.