Astrophysics Explorers Program
2021 Medium Explorer (MIDEX) AO
Q&A

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Q-1 **Where technologies are proposed that are not yet mature to TRL 6, is the proposed backup plan evaluated against the baseline science?**

A-1 Yes. TMC only considers the Baseline Science Mission (see Section 5.1.4 of the Draft 2021 Medium Explorers Program AO) when evaluating the proposals. Backup plans are required for technology not yet at TRL 6, and TMC evaluates those plans against the Baseline Science Mission. Proposals generally include less-mature technologies to enable more ambitious baseline science. A team proposing less-mature technology should make its best case for the approach to maturing that technology, and its best argument that the backup technology will produce science that will also meet the baseline, or will produce science only slightly degraded from the baseline. Factor B-4 of the Science Implementation review considers the backup plans in the context of the threshold mission.

Q-2 **How is the threshold science mission assessed?**

A-2 Requirement B-18 of the Draft MIDEX AO defines the threshold science mission as the "minimum acceptable data and scientific return for the mission, below which the mission would not be worth pursuing". The scientific value of the Threshold Mission is considered in the Form A review. In the Science Implementation review, factor B-4 assesses "the approach to descoping the Baseline Science Mission to the Threshold Science Mission" if development problems force a reduction in scope, while the maturity of both baseline and threshold Level 1 science requirements are evaluated in Step 2.

Q-3 **Part of Requirement B-4 of the AO states "Two extra pages are allotted for each additional separate, non-identical science instrument in the Science Section (Sections D and E); two extra pages are allotted for each additional separate, non-identical flight element (e.g., additional non-identical spacecraft) in the Mission Implementation and Management Sections (Sections F and G) ". Does the "additional separate, non-identical science instrument or flight element" count start from zero or one?**

A-3 The word **"**additional**"** means that no extra pages are allotted where only a single instrument and a single flight element is proposed, or where all instruments and all flight elements are identical. For example, a proposed investigation with two separate, non-identical science instruments would be allotted two extra pages in the Science Section (Sections D and E).

Q-4 **Can supplies and services be purchased from non-U.S. sources using NASA funds?**

A-4 The NASA FAR Supplement (NFS) under 1835.016-70, "Foreign participation under broad agency announcements (BAAs)" item (a)(2) states that "use of a non-U.S. manufactured launch vehicle is permitted only on a no-exchange-of-funds basis"; NASA funds may not be used. Item (a)(3) states "NASA funding may not be used for subcontracted foreign research efforts. The direct purchase of supplies and/or services, which do not constitute research, from non-U.S. sources by U.S. award recipients is permitted."

Q-5 **Are unencumbered cost reserves required to be budgeted under the PI-Managed Mission Cost (PIMMC) for AO-provided access to space?**

A-5 Missions are not required to hold cost reserves against the cost of AO-provided launch services (whether standard or mission-unique), or against the impact to the mission of any launch delay caused by AO-provided access to space. Proposers are responsible for potential launch delay costs as a result of spacecraft or payload delays.

Q-6 **May respondents propose Commercial Ground Station services in place of SCaN provided data services?**

A-6 Yes. Requirement 26 in Section 5.2.5 of the draft AO states "Proposals shall include mission requirements for telecommunications, tracking, and navigation; proposals shall also include a plan for meeting those requirements. If non-NASA networks are used, a cost plan for the use of services shall also be included in the PIMMC." Please also note that this section also states "NASA funds may not be used for the construction of new facilities for non-NASA communications services."

Q-7 **Will Requirement 99 be revised to allow for submission via NASA's Large File Transfer (LFT)?**

A-7 The final AO will specify how electronic files must be submitted.

Q-8 **Will the page count for Section H and Appendix J.12 (Heritage) be increased to compensate for the change in lines per inch?**

A-8 The page count for Section H and for Appendix J.12 will remain unchanged in the final AO.

Q-9 **The last sentence in requirement B-56 reads "A complete letter of commitment from a vendor will include the specifics of the quote. " However, vendors are typically not major partners and would not have a letter of commitment.**

A-9 Section 5.8.1.2 of the draft MIDEX AO defines a major partner as **"**The organizations, other than the proposing organization, responsible for providing science leadership, project management, system engineering, spacecraft (as applicable), science instruments, PI-Team-Developed TDOs, integration and test, alternative access to space, mission operations, and other critical or essential products or services as defined by the proposer; all organizations, other than the proposing organization, receiving or contributing more than 10% of the PI-Managed Mission Cost are included, regardless of role. **"** Vendors covered by this definition are required to provide a letter of commitment.

Q-10 **Section 5.2.3 uses the acronym "TDOs". In other AOs, TDOs are Technology Demonstration Options that are optional and not part of the baseline mission.**

A-10 This AO allows only PI-Team-Developed Enabling TDOs, which are necessary to achieve the Baseline and Threshold Science Missions. This AO does not allow Enhancing TDOs, which must be clearly separable from the proposed Baseline and Threshold Science Missions to the extent that it will not impact either if the TDO is deleted from the mission.

Q-11 **Could the Launch Services Program Information Summary address what would be done if the mass allocation for secondary payloads prevents the primary payload from achieving its optimal orbit?**

A-11 The primary mission has first priority for launch vehicle capability. Secondary payloads would be flown only if the launch vehicle has sufficient capacity in excess of what is required by the primary payload.

Q-12 **Section 1.2 lays out NASA's expectations concerning Diversity, Discrimination and Harassment. Our project would like to understand better how striving for better diversity flows down into the project team management, and what information and demographics we need to provide to demonstrate compliance. In addition, it is unclear whether as part of our proposal we need to document that the proposing institution and contractors have the required policies and procedures in place.**

A-12 The proposer is free to decide how to demonstrate how the project will advance diversity and inclusion.

Q-13 **Will information be available in the *Launch Services Program Information Summary (LSPIS)* on payload mass-to-orbit capability for each class of Launch Vehicle for inclinations from the launch site latitude (~28.5 degrees for KSC) down to as low an inclination as possible?**

A-13 Proposers should contact the Point of Contact for the Launch Services Program (LSP) for information that is not included in the LSPIS.

Q-14 **Must the proposed solution for the Space Systems Protection requirements be independently FIPS certified, or just FIPS compliant as verified by the Project?**

A-14 FIPS compliant as verified by the project is sufficient. The FIPS web site (https://csrc.nist.gov/projects/cryptographic-module-validation-program/validated-modules/search/all) lists compliant systems that have been independently certified. However, the project does not need to pay for a separate independent certification of a system that does not appear in the list.

Q-15 **The table in Section 3 of the AO gives a target downselection date of Fall 2023, which is only a year after the target selection date for the 9-month competitive phase A studies. Is the downselection date correct?**

A-15 The listed target downselection date was a typo. The final AO will include corrected dates.

Q-16 **In the event that an Explorers investigation requires concurrent operating NASA assets (e.g. JWST) for science objective closure, is there an approach to secure the required observing time as part of the Explorers proposal process?**

A-16 At the moment there is no approach in place to secure observing time on a NASA observatory (including Webb) as part of the Explorers proposal process. Observing time on a NASA observatory may be proposed as a Science Enhancement Option (SEO). The science review panel will consider the merit of the proposed SEO.

Q-17 **Does the Explorers program allow for supporting ground-based observations required for science closure to be made with NSF assets (e.g. Gemini), provided the necessary commitments are made and documented in the proposal?**

A-17 Explorers proposals may include partnerships with, and contributions from, ground-based observatories. NASA has no policies that distinguish NSF-supported ground-based facilities from other ground-based facilities.

Q-18 **A new document "Lunar Exploration Ground Sites (LEGS)" has been posted under item 5 in the MIDEX Program Library, offering direct-to earth communication and navigation services for missions operating from 36,000 kilometers (km) in the GEO to cis-lunar space and other orbits out to 2 million km, bridging the gap between the NEN and DSN. How should a proposer obtain further information about LEGS capabilities and associated costs**?

A-18 Information on costs will be included in an updated version of the SCaN MOCS document, which will be available in the Program Library by September 2021. Meanwhile, proposers may contact the POC named in Section 6.1 of the current SCaN MOCS document.

Q-19 **A new document "SMD-SCaN MOA cost changes April2021" has been posted under item 5 in the MIDEX Program Library, showing changes in the cost attribution between the mission and SCaN, relative to the SCaN MOCS Rev 2, effective 03/15/2021. Will this information be included in an updated version of the SCaN MOCS document?**

A-19 ~~Information on cost attribution will be included in an updated version of the SCaN MOCS document, which will be available in the Program Library by September 2021.~~ This document has been deleted. See Q&A 24. *[Amended 09/08/2021]*

Q-20 **Section 5.2.7 of the draft AO states that "Lunar missions must address disposal to avoid increasing the hazard to other spacecraft." Is passivation of the spacecraft at end of mission sufficient, or does disposal require other means, such as impact or placement into a "graveyard" orbit?**

A-20 No action beyond passivation (as defined by Requirement 4.4-2 of NASA-STD-8719.14B) is currently required for spacecraft in lunar orbit, although that document includes further requirements for spacecraft at Earth-Moon Lagrange points. Also relevant are Requirements 4.4-1 (to limit accidental explosions) and 4.4-3 (to limit intentional breakups).

Q-21 **A new document "Near Space Network Brochure (NSN) Brochure" has been posted under item 5 in the MIDEX Program Library, stating that NSN provides communications and navigation services for missions within 2 million kilometers of Earth. How are the NSN capabilities related to the Near Earth Network, and to the LEGS capabilities of Q&A 18?**

A-21 The Near Space Network will incorporate the capabilities of the Near Earth Network (NEN) and LEGS. A user guide for NSN is in preparation. Meanwhile, proposers may contact the POC named in Section 6.1 of the current SCaN MOCS document, or Vir Thanvi, Near Space Network Project Manager, at vir.thanvi@nasa.gov.

Q-22 **The MIDEX AO released today provides conflicting information on the PI-Managed Mission Cost. Page (i) reports the cost cap as $300M FY2022, whereas page 34 specifies $290M FY2022. Which is correct?**

A-22 The correct amount for the MIDEX AO Cost Cap is $300M FY2022. A clarification ~~will be issued~~ has been issued through NSPIRES.

Q-23 **The AO released on August 24, 2021 gives the target Downselection date as Fall 2024, which is a change from the draft AO, and leaves only a short period between the Phase B start and the Launch Readiness Date (LRD). Is the LRD correct as stated?**

A-23 The target Step-1 Selection and Downselection dates were clarified on August 27, 2021, and the clarification is posted on NSPIRES.

Q-24 **The recently posted SCaN MOCS Rev 4 document says that pass costs must be estimated and included in the proposal, but the Cost Changes for DSN/NSN document says that these costs are not the responsibility of the mission. Are these consistent?**

A-24 Yes, the documents are consistent. The Cost Changes document specifies internal funding transfers within NASA, and has now been removed from the Program Library. Requirement 27 of the AO states that all communication costs for NASA's network services should be included in the PI-Managed Mission Cost, even if the mission will not be directly billed, with the sole exception of DSN Aperture Fees. ~~which costs are covered by SCaN and which are the responsibility of the mission. Those that are listed in the cost changes document as the responsibility of the mission fall under the cost cap, as stated in Requirement 27 of the AO. The SCaN MOCS document states that proposers must estimate all costs, in accordance with NASA's full cost accounting policies, including those that will be covered by SCaN.~~ *[Amended 09/07/2021]*

Q-25 **At the Preproposal Conference and in Section 1.1 of the AO, it was strongly recommended not to bid to the cost cap because of all the items deferred to step 2. Will the TMC panel have some pre-defined cost allocation for those items in step 1? What is your guidance in terms of reserves in relation to the deferred items?**

A-25 All costs that are proposed under the PIMMC will be evaluated, except those for items deferred to Step 2. TMC does not hold a cost allocation for those deferred items. A proposal at the cost cap holding the minimum required reserves would be compliant, but cost savings might be required at Step 2 to accommodate the deferred items, especially if the evaluation panel identifies cost threats to the unencumbered reserves. Proposers should provide justifications for the reserves that they propose to hold (see AO Requirements 65 and 66). If proposing under the cost cap, keep in

mind that in Phase A, the (Step-2) PIMMC will not increase more than 20% from the (Step-1) proposed PIMMC, nor can it be above the AO cost cap or adjusted AO cost cap.

Q-26 There's a "Scenario 3" is the Launch Services summary in the Program Library. Was that a typo?

A-26 Scenarios 1 and 2 are the only relevant ones. Discussion of Scenario 3 has been deleted in the Rev B version of the Launch Services Information Summary document, and updated in the Program Library.

Q-27 For Launch Services, are we still compliant with the AO Requirement 96 if we fit within only Scenario 2, as documented in the Launch Services Information Summary document?

A-27 Compatibility with at least one of the two scenarios in the Launch Services Information Summary document will demonstrate compliance to Requirement 94 and Requirement 96. We recommend further discussion with the Launch Services Program to verify that your investigation is not able to be compliant with both scenarios. If this is the case, the proposal should state that the investigation will be compatible with one but not both scenarios, which will be relayed as a comment to the Selection Official and not a finding.

Q-28 Our concept development has been based on use of the DSN (34m Ka). Is it acceptable at this stage to continue with our existing plans and hold LEGS vs DSN for the ground system as a Step 2 trade? Or, given our orbit altitude, do we need to shift to LEGS in Step 1?

A-28 For Step 1 of this AO, proposers may use the 34m Network as the basis for their design, but must also include a LEGS compatible mode. In their Step 2 submission, proposers will be expected to include a trade between the 34m and LEGS compatible modes, and base their concept of operations on the results of that trade. For future AOs, it is expected that all missions within the 2 million km boundary will use LEGS, while missions outside that boundary would use DSN assets.

Q-29 For AO purposes, is Lunar Exploration Ground Segment (LEGS) part of the DSN or NSN?

A-29 The LEGS system is part of the Near Space Network (NSN).

Q-30 Would the LEGS costs be part of the PIMMC, whereas the DSN aperture fees are outside of the PIMMC?

A-30 Yes, but see the Q&A 28.

Q-31 **When will LEGS be fully functional with all antennas?**

A-31 The LEGS system is still in development. It is expected that the first node will be active in 2024 and the other two nodes after that. SCaN expects that the LEGS system will be fully operational in the 2026 timeframe.

Q-32 **Is there cost estimating information for LEGS available?**

A-32 Please see section 5 of the Mission Operations Communication Services (MOCS) document, Rev 4, which is included in the AO library. For the purposes of cost estimation, the use of LEGS is analogous to the use of NSN Direct-to Earth assets (Table 5.1).

Q-33 **Could the LEGS system accommodate for continuous link?**

A-33 The answer depends on the mission concept of operations. There is a difference between continuous support over a 24 hour period with no gaps, a standard pass length that includes a handover between systems, or and a series of contact times. Contact the SCaN POC listed in the AO for more information.

Q-34 **The AO strongly recommends downlink of science data using Ka band services. Does that recommendation apply to all services? Does that recommendation apply to commercial or proposing institution services?**

A-34 The frequency recommendation applies to all NASA /SCaN services. Most commercial entities agree with the recommendation. Proposers are encouraged to reach to the SCaN Mission Commitment Office via exploration-enabled@lists.nasa.gov to determine if commercial service providers [that may be under contract to SCaN] would be able to accommodate other frequency bands.

Q-35 **Where can customers get more information on the SCaN's services, costs and interfaces?**

A-35 Additional information can be found on the respective organization websites or by contacting the Mission Commitment Office at exploration-enabled@lists.nasa.gov.

- For an overview of SCaN Services:
  - https://www.nasa.gov/directorates/heo/scan/services/overview/index.html
- The SCaN Customer Service Portal:
  - https://www.nasa.gov/directorates/heo/scan/csp

- The SCaN Customer Service Portal Resource Documents
  - https://www.nasa.gov/directorates/heo/scan/csp/resources/
- Mission Operations Communication Services (MOCS) Document:
  - MIDEX Program Library, Item 5 under Program Specific Documents
- For NSN Services:
  - https://esc.gsfc.nasa.gov/projects/NSN
- For DSN Services: https://deepspace.jpl.nasa.gov/about/commitments-office/

Q-36 **Must the NSN per-minute fees be included in the PI-Managed Mission Cost (PIMMC), and in the cost tables? Section 5 of the recently posted SCaN MOCS Rev 4 document states both that the "calculated estimate of services provided is required by the SMD to document the full value of the mission and its services", and that "NASA missions that use standard services will not be charged by SCaN for recurring cost for aperture or per-minute fees."**

A-36 The NSN per-minute fees must be included in the cost tables and in the PIMMC, as stated in AO Requirement 27. The SCaN MOCS Rev 4 document discusses what costs SCaN will charge to SMD. To level the playing field, and to enable trades between SCaN services and other aspects of the mission, all NSN communication costs must be included in the PI-Managed Mission Cost, whether or not SCaN will charge SMD for those services. See Q&A 24 and Q&A 30 above.

Q-37 **The AO includes Requirement 85 on marking export-controlled material but has no requirement for Controlled Unclassified Information (CUI) markings. Are proposals required to have CUI markings?**

A-37 Proposals written in their entirety by non-government institutions are not mandated to follow CUI marking instructions. However, proposals that are written fully or partially by government institutions are required to include CUI markings. For those proposals, it is mandatory to include a banner marking at the top of each page that contains CUI, to alert the reader. For example, pages with export-controlled information would get a "CUI//SP-EXPT" banner. Though not required except for NASA Export Controlled information, portion marking is highly encouraged and can be accomplished by including a red bordered box, as shown in the document CUI_Portion_Marking_Sample.pdf in the Program Library. Portion marking can also be done according to NASA CUI Handbook, page 11(https://cset.nasa.gov/wp-content/uploads/2021/05/ITS-HBK-CUI_v1.0.0.pdf).