

Question and Answer Log
Next Space Technologies for Exploration Partnerships-2 (NextSTEP-2)
ANNOUNCEMENT

As of April 28, 2016

BACKGROUND:

In April 2016, NASA issued a competitive announcement requesting U.S. private sector proposals to partner with NASA on the development of critical technologies needed for the next steps in deep space human exploration. This effort, is a follow-on to a Broad Agency Announcement (BAA) released in October 2014 called the Next Space Technologies for Exploration Partnerships (NextSTEP) and is referred to as NextSTEP-2. This BAA is an omnibus BAA with Appendices being released to solicit for specific areas of research. The initial solicitation, Appendix A, is seeking architecture concepts and ground prototype habitation systems for deep space missions.

QUESTIONS:

POLICY - STRATEGY

Q1: What role does this effort play in NASA's strategy to send humans to Mars?

A: The NextSTEP activities are developing the concepts and technologies needed for development of the deep space, long duration habitation capabilities that would be required for a journey to Mars. These efforts include development and refinement of an evolvable, modular architecture and ground prototypes that can be tested to validate the concepts and technologies. Eventually, flight systems will be built based on these ground prototypes that will be used to validate the deep space capabilities in the proving ground around the moon and beyond.

Q2: What is the relationship of this program to the SLS and Orion programs, which are supposed to take humans into deep space?

A: The Orion spacecraft and SLS are NASA's first major components for human presence in deep space. With the transportation system progressing toward a maiden flight in 2018, NASA is now looking toward development of deep space habitation capabilities – the next major component of human space exploration beyond low-Earth orbit. In addition to Orion, NASA requires these deep space habitation capabilities to enable long-duration missions of up to 1000 days.

Q3: What is the relationship of this program to the Asteroid Redirect Mission?

A: If elements of the overall habitation capability are available when the ARRM brings back asteroid material to cislunar space, we will be able to perform EVAs out of the habitat capabilities instead of only with Orion. This is one of the potential design reference missions included in Appendix A.

Q4: There is already both a Commercial Crew program and Orion developing crewed space systems; why is another crewed system required?

A: Although both the Commercial Crew program and Orion are providing crewed space transportation, the system capabilities support different missions. The Commercial Crew program is specifically designed for short duration transport of humans to low-Earth orbit. The Orion spacecraft provides transportation for humans beyond low-earth orbit and will have a capability of sustaining a crew of 4 for 21 days in deep space and returning them safely to Earth. The systems being developed and tested by NextSTEP when combined with Orion, will provide an evolvable capability for longer duration missions in deep space with potential initial missions in the proving ground and beyond.

Q5: Will this habitat system be like another ISS but in cislunar space instead?

A: No. ISS has been continually crewed since 2000 in low earth orbit for conducting continuous research across a wide range of disciplines. These habitats will not be initially continuously crewed and will need to be able to operate autonomously without crew onboard. Any initial habitats will also have smaller mass/volume due to the primary purpose being for support to crewed missions and not a wide range of research requiring multiple and complex research facility capabilities. These habitats will also be designed to survive the deep space environment (e.g.. Higher radiation, more efficient regenerative ECLSS, Improved exercise systems, more comprehensive medical capability, long-duration food supplies) and work with intermittent and higher communication delays.

Q6: Is the focus of the NextSTEP-2 BAA on a habitat for Mars or nearer term proving ground missions around the Moon?

A: The focus of Appendix A activities is to develop evolvable, modular architecture concepts based on common interfaces and standards, and ground prototypes to test out these concepts for deep space. There are multiple approaches that could be valid in achieving this final goal of long duration deep space habitation capabilities. Many of the approaches could include evolvable and incremental build up of habitation capabilities that could benefit from early testing in cislunar space to validate the capabilities needed for the long-duration missions. In addition, NASA is looking to reach long duration deep space habitation objectives while leveraging available industry existing or planned capabilities in LEO for commercial habitation in support of commercial space stations. NASA is seeking concepts and approaches that lead to the final objective but is not dictating the approach to getting to that objective.

Q7: What are the missions that these habitats will execute?

A: The early delivery of any short duration habitation capabilities as an initial step towards long duration deep space cislunar habitation should be evolvable to the full capability required for Proving Ground Phase 2. Additional activities that may benefit from new habitation capabilities include:

- Long Duration Exploration Systems Testing
- Automation, Tele-operations, and Robotics
- Human Assisted Sample Return beyond the ARCM
- In Situ Resource Utilization (ISRU) Demonstration Missions

- Human Research in Deep Space
- Logistics Support
- General Science
- Deep space long duration (e.g., Mars) spacecraft assembly, refurbishment and validation

Q8: Under the background section of Appendix A, there is a list of additional activities that may benefit from new habitation capabilities. What might be an example of Human Assisted Sample Return beyond the ARCM?

A: There are currently draft mission concepts for both lunar and Mars sample returns to cislunar space that could be enabled using crewed systems for the final return of samples to Earth.

Q9: Why is NASA soliciting industry-built habitation concepts? Why can't NASA build its own habitation?

A: An important part of NASA's strategy is to stimulate the commercial space industry while leveraging those same commercial capabilities through public-private partnerships and potentially future contracts to deliver mission capabilities at lower costs. NASA is looking to reach long duration habitation objectives while leveraging available industry existing or planned capabilities in LEO.

Q10: Why must the habitation concepts be designed for cislunar space? Why not Mars?

A: Habitation concepts will be designed for the deep space environment enabling them to operate around the moon as well as surviving the deep space environment in the vicinity of Mars. Cislunar space is the location NASA plans to validate these capabilities before departing on long duration mission to Mars.

Q11: Why does NASA require the performers to commit their own resources to the development designs and prototypes?

A: NASA is looking to reach long duration habitation objectives while leveraging available industry existing or planned capabilities in LEO.

Q12: Why must the concepts support commercialization in low-Earth orbit if the end goal is cislunar space or Mars?

A: NASA is looking to reach long duration habitation objectives while leveraging available industry existing or planned capabilities in LEO. NASA plans to transition from LEO operations with the International Space Station into deep space missions. To enable that transition NASA is encouraging the creation of supply and demand markets for LEO.

Q13: What is a prototype cislunar habitat?

A: The NASA Procedural Requirements NPR 7120.8 definition of a proto-type is as follows: "The proto-type unit demonstrates form, fit, and function at a scale deemed to be representative of the final product operating in its operational environment. A subscale test article provides fidelity sufficient to permit validation of analytical models capable of predicting the behavior of full-scale systems in an operational environment."

Q14: When will the first flight of a cislunar habitat occur? When will the 1000 day mission occur?

A: NASA envisions that initial cislunar missions could occur as soon as the early to mid 2020's. NASA has not specified a precise date for the mission to the vicinity of Mars. The reference in Appendix A to 1000 days is representative of the types of duration such missions could potentially last.

Q15: How long will the cislunar missions last? (what is the duration of the missions?)

A: Mission durations may range from a few days to more extensive periods for a long-duration shakedown mission to complete the validation of the habitation and transportation capabilities.

Q16: Has NASA specified specific requirements for these cislunar habitats?

A: NASA is employing a rapid prototyping development activity where we build, test, and repeat with refinements. Requirements will be further refined based on validation of the concepts developed and tested in earlier cycles (such as this Phase 2 effort). This approach will greatly reduce system development costs. During this Phase 2 effort a significant portion of the effort will also be in the development of standards and common interfaces. These will drive future requirements for habitation capabilities.

Q17: What is the funding?

A: Please refer to the Appendix A Section 6.3.

Q18: What role are international partners playing in this development? (or Is there a role for international partners in this activity?)

A: At the end of Phase 2, the acquisition for flight elements will be determined based on these this activity as well as ongoing international partner studies. In addition, international entities may participate as team members in the Phase 2 activities. Please refer to the omnibus BAA and Appendix A Sections on eligibility.

Q19: How will the cislunar habitats be launched?

A: Proposers are instructed to define the launch requirements for their deep space habitat architecture concept. Appendix A, Section 2 defines some of the launch options.

Q20: There are several different specifications for SLS payload capability. Can you clarify what the SLS payload capability will be?

A: The currently envisioned SLS payload capabilities are described in the Virtual Industry Forum presentation posted at www.nasa.gov/nextstep

Q21: Will all four currently awarded Habitat System Phase 1 contracts continue into Phase 2?

A: Proposals from the current Phase 1 contractors will be evaluated using the same criteria as proposals submitted from this BAA.

Q22: How much funding was spent on habitation under NextSTEP-1? The release for the selections stated that the seven NextSTEP habitat projects will have initial

performance periods of up to 12 months, at a value of \$400,000 to \$1 million for the study and development efforts, and the potential for follow-on phases to be defined during the initial phase.

A: Phase 1 Habitat area contract values:

4 Habitat Contracts:

Bigelow Aerospace:	\$745,160
Boeing:	\$1,003,256
Lockheed Martin:	\$982,039
Orbital ATK:	\$999,998

3 ECLSS Contracts:

Dynetics:	\$998,114
Orbital Technologies:	\$600,000
UTC Aerospace Systems:	\$824,829

ACQUISITION

NOTE: Those who ask detailed acquisition questions should be referred to the Announcement and the Point of Contact listed in the Announcement

Q23: What will NASA do with the modules delivered to a center after it is done testing?

A: NASA does not intend to take ownership of the hardware but is only taking limited possession for test and demonstration purposes. Modules shipped to a NASA center will be returned to the contractor after the Government activities are done.

Q24: Page 10 of Appendix A states that CLIN's may be negotiated and activated based on programmatic priorities and funding availability. It also implies these CLINs may be activated at different dates during the contract. What is NASA awarding? I am assuming they are awarding contracts that include a list of work packages and even if the packages are spread out in time, NASA plans to use that to help define billing amounts.

A: NASA plans to negotiate and award selected CLINs for the base period and the option. Contracts will be incrementally funded and not all CLINs may be funded at the start of the contract, depending on available government resources. If/when the government decides to fund a CLIN, an ATP will be issued and the contractor may begin executing that CLIN. This would also apply to CLINs in the option. For example if an activity selected for execution starts in the base period (e.g., call it CLIN 1A), and proceeds to completion in the option

(e.g. call it CLIN 1B), when the Government elects to proceed with the option it could activate CLIN 1B (contingent upon availability of funding and successful achievement of all CLIN 1A milestones). Once ATP is issued for a CLIN, NASA is committed to funding the completion of that CLIN, based on successfully achieving the milestones associated with it.

Q25: Can you describe more how the "on-ramp" aspect of this BAA works? Do you intend to facilitate matching system-level proposals with existing whole-habitat projects?

A: There is no actual on-ramp provision in Appendix A. However, there are currently four contractors under previous award for Phase 1 conducting concepts of operations and architecture studies for deep space habitat systems. Those contractors will be submitting proposals for Phase 2 as required in their Phase 1 contracts, refining architectures and developing ground prototype habitat systems. The contractors currently under contract also are free to team with other eligible entities for their Phase 2 activities. Additionally, NASA would like to provide an opportunity for other contractors that did not participate in Phase 1 studies to propose their innovative approaches that will both satisfy NASA's initial NextSTEP Phase 1 objectives and the objectives contained in Appendix A. NASA is seeking proposals to provide complete deep space long duration architecture designs (including standards, common interfaces, and testing approach) and the development of full size, ground prototype units no later than 2018. Any teaming arrangements are the responsibility of the proposers. NASA expects all proposals to be for the full set of objectives as defined in the BAA and Appendix.

Q26: On page 12 of the BAA NNHZCQ001-K states: "(approximately ATP + 18 months)" What does ATP mean?

A: ATP stands for "Authority To Proceed". It is the point in time at which the Government contracting officer authorizes the contractor to begin work. This usually means that a fully executed contract with finalized terms and conditions has been agreed to and signed by both the Government and the contractor. Note, there may be separate ATP's issued within a single contract for Contract Line Item Numbers (CLINs) as programmatic priorities allow or funding becomes available.

Q27: I have a question about the cost-sharing requirement on the NextSTEP-2 BAA. We are considering a proposal where a commercial company might be subcontracted by our university to do a portion of the work. The commercial company would gain IP in the project – they are not merely doing a piece of work like a machine shop, for example. Does such a commercial entity as subcontractor need to provide cost-sharing, and would it need to be in the ballpark of 50% value?

A: Please refer to Section 3.2 of the Omnibus BAA and Section 3.2 of Appendix A that define the Corporate Resource (CR) requirements. The CR requirement for this Appendix is 30% of the overall effort with at least half contributed during the period of performance and the remainder may be prior contributions made within the last year. The CR requirement applies to the team, there is no requirement for how the CR is allocated among the team members.

Q28: After reading the BAA Appendix 1, we were wondering, when it says "feasible modular elements," is this a call for complete modules as in the sense of an ISS module (such as the recently deployed BEAM), or do you envision supporting work on finer grain systems?

A: Unlike the original NextSTEP BAA released in 2014 which allowed proposals for subsystems, the NextSTEP-2 BAA, Appendix A is focused on complete architecture concepts and full size ground prototype habitats. Please refer to Appendix A, Section 2.1: "Therefore, NASA is seeking proposals to provide complete deep space long duration architecture designs (including standards, common interfaces, and testing approach) and the development of full size, ground prototype units no later than 2018."

Q29: Will slides be available? Will there be a recording of the presentation?

A: Yes, slides will be made available at the NextSTEP website: www.nasa.gov/nextstep. There is no plan to release a recorded briefing.

Q30: Can a contractor currently on contract for Phase 1 submit a proposal for Appendix A, Habitat Systems?

A: Yes. However, the contractors currently under award for Phase 1 already have an obligation to produce a Phase 2 proposal as part of their Phase 1 effort. Any activities from their proposal selected for Phase 2 will not result in new contracts but will be modifications to their existing contract.

Q31: Can a proposer submit a proposal with one of the four currently awarded contractors as a team member?

A: Yes. The contractors currently on contract for Phase 1 may also team with other companies for Phase 2.

Q32: Does this NextSTEP-2 BAA Appendix A include proposals for ECLSS systems or other subsystems supporting long term, deep space habitat systems?

A: No. Appendix A is focused on developing complete habitation systems.

Q33: Are not for profit entities (such as universities) allowed to submit a proposal?

A: Any U.S. private-sector entity meeting the eligibility criteria may submit a proposal. The proposals will be evaluated as described in the announcement.

Q34: Can industry members team together for a partnership?

A: Any company or team of companies meeting the eligibility criteria may submit a proposal. The proposals will be evaluated as described in the announcement.

Q35: What is the anticipated funding level for each awarded contract?

A: The funding level across the total effort for combined contracts for Habitat Systems is specified in Appendix A. Individual award amounts will be dependent upon specific proposals and final negotiated terms and conditions.

Q36: How will we know if due diligence is being performed during the evaluation? Or if we are selected for due diligence?

A: You will be notified if NASA requires any clarifications or further discussions.

Q37: How long will we have to submit a revised proposal if given that opportunity?

A: You will be informed of your response timelines at the time of any requests for additional information.

Q38: Who will own the IP rights for these developments worked with NASA?

A: IP ownership is determined by the nature of the entity doing the work (large business, small business, nonprofit organization, or educational institution). Please see the omnibus and Appendix A for details on data and patent rights ownership.

Q39: Will NASA allow other types of partnership relationships, such as grants, CRADA's, or Space Act Agreements?

A: The type of acquisition instrument will be defined in the Appendix describing each solicitation. The NextSTEP-2 omnibus BAA will not result in CRADA's and Space Act Agreement but has provisions for the possibility of contracts, grants, and cooperative agreements. Appendix A awards will be contracts.

Q40: How many contracts do you anticipate awarding?

A: The number of awards has not been anticipated but will be determined based on the number of qualified proposals of merit meeting requirements and the funding available. The funding available for this activity is defined in Appendix A, Section 6.3

Q41: How long will these partnerships last (is there an end date?)

A: Each solicitation will describe expected or potential partnership durations in the relevant Appendix. Efforts for various grants, cooperative agreements and contracts may vary from a few months to multiple years and may consist of initial studies with follow-on options for further development. The contracts anticipated for awards for Appendix A are described in Section 6.1 and may vary from 12 to 24 months depending on phases awarded, with potential follow-on phases.

TECHNICAL: OBJECTIVES/REQUIREMENTS

Q42: It is unclear who will be doing the integration of the complete habitat system and there is reference to GFE. Can you clarify whether NASA will be doing the overall system integration, or will the contractors be required to do that?

A: The awarded contractors are expected to refine their complete deep space habitat architecture concept, and develop the selected module(s) and selected associated subsystems that are consistent with the architecture. The contracted activity would include integration and test of the module (captured as severable CLINs and milestones). It is recognized that the prototype being developed may not be consistent with the modular, evolvable architecture standards and interfaces developed by the NASA-led working group during the first 12 months. The plan for the working group is to also recommend options for which subsystems could be provided as Government Furnished Equipment (GFE). During the last 6 months of the development, the contractor may be able to make limited

adjustments to the prototype consistent with the common interfaces and standards. Moreover, the last 6 months will allow the contractor to revise their architecture and prepare proposals for the next Phase that will develop flight prototypes incorporating the common standards and interfaces.

Q43: What is the expected fidelity of the prototype modules developed?

A: We expect full size form and fit and some level of functionality.

Q44: How will AES developed technologies and concepts work into the NextSTEP habitat program?

A: The concept for integrating AES-developed technologies is depicted in the Virtual Industry Forum presentation posted to www.nasa.gov/nextstep

Q45: What hardware will be needed to support the testing of the ground prototypes? When will this hardware be specified?

A: The proposers are to specify the testing and associated hardware and facilities for their proposed concepts. There will also be standards and common interfaces defined in the standards working group.

Q46: When you start getting hardware, how are you going to contractually manage delivery of hardware to centers?

A: Appendix A Section 4.2.1.4 contains instructions for proposers for shipping arrangements.

Q47: How will the interface standards working group operate? What are the expected products and goals of the working group and who will be the members?

A: NASA will work with working group members to determine a charter and terms of reference for operating the organization.

Q48: Why is NASA potentially funding multiple modules from different contractors?

A: Various approaches have different advantages and employ different innovative concepts and functional allocations. We wish to allow concepts showing potential to continue their development so we may test them and obtain lessons learned.

Q49: Are multiple proposals allowed?

A: Yes, however we encourage offerors to consolidate their best concepts into a single proposal.

Q50: What testing will be conducted on the modules?

A: The types of testing envisioned for the modules is described in the Virtual Industry Forum presentation.

Q51: What are the shipping requirements or constraints on the modules?

A: Appendix A of the proposal instructs offerors to define the shipping concept.

Q52: How precise does cost need to be?

A: The prices for the need to be as precise as possible since these costs will become the fixed price of any resultant contract awarded. The proposal may contain estimates of lower fidelity for follow-on phases, but NASA expects these estimates would become more precise particularly if the follow-on efforts were also awarded on a fixed priced basis.

Q53: How many resumes are required?

A: The number of resumes is a business decision for the proposer.

Q54: What does 30% minimum corporate resources (CR) mean?

A: Corporate contributions are measured in relation to the entire effort, which is the combination of corporate resources and government resources if any are proposed. Therefore, when a minimum of 30% CR is required, the corporate contribution must be greater or equal to 30% of the sum of the total government costs (price plus GFE/GFP) and corporate resources. See Section 3.3 of the omnibus BAA and Section 3.2, Appendix A: Habitat Systems for more specifics on corporate contributions.

Q55: Do state and local funds count?

A: Please refer to the amended Section 3.3, Corporate Resources, of the Omnibus BAA.

Q56: What about corporate sponsorship passed through from the Government?

A: No, these would not count towards corporate resources.

Q57: If they have partners (non-government), will their contributions count?

A: Yes. Non-government co-proposers contributions count as corporate contributions.

Q58: Please clarify use of specialized government facilities.

A: Use and cost need to be included in the proposal. Any proposed use of a Government facility will be treated as Government resources and will need to be offset in the corporate resources area. Refer to Section 3.3, Corporate Resources of the omnibus BAA and Section 3.2 of the Appendix A.

Q59: Is there a statute of limitations on how long the investment in facilities counts?

A: Please refer to the Corporate Resources section of Appendix A.

Q60: Are universities eligible to fill the role of the private partner?

A: Yes, refer to the Eligibility Information in the omnibus BAA and Appendix A.

Q61: Is the prior investment rule for the entire proposal, or, will each organization participating in a proposal need to claim some sort of cost or in kind contribution or investment?

A: Please refer to the Section 3.3, Corporate Resources and Section 3.2 of Appendix A. The corporate resources is based on the entire proposed effort.

Q62: Can prior government investment be counted toward the 30% rule?

A: No. Please refer to the amended Section 3.3, Corporate Resources.

Q63: The eligibility clause states prior IRAD funds are deemed acceptable for this effort. Is there a time window allowing credit of prior IRAD spending? Or can the credit be applied to all prior relevant IRAD projects that contribute to this proposal?

A: The requirements for Corporate Resources will be specified in each Appendix. For Appendix A, please refer to Section 3.2 of the Appendix.

Q64: Are SBIR funds also applicable towards the corporate contribution requirement, and if so, is there a time limit on those?

A: SBIR funds originating from previous federally funded efforts are not applicable toward private corporate contributions. Any corporate resources devoted to those previous effort would count toward the percentage of CR requirement if those resources were provided within the statute of limitations. See Section 3.3 Corporate Resources of the omnibus BAA.

Q65: I understand that NASA centers are not allowed to lead proposals, but I was unable to determine from the announcement if they are allowed to be partners, and if so, are they allowed to provide cost-sharing?

A: Please refer to the, eligibility sections of the omnibus BAA and each individual Appendix.

Q66: I am curious if funds from other government agencies (such as DoD SBIR funds) can be included in the cost match?

A: No, funds from other FEDERAL government agencies cannot be included as corporate contributions.

Q67: For a foreign participant in a US led proposal, can the “funding/sponsoring institution” be the foreign company itself? That is, can a foreign company participate with a US led team by contributing (self-funding) work in coordination with the US led team?

A: Yes, foreign participants are eligible to respond to the BAA, but must comply with the Guidelines for Foreign Participation which require there be no-exchange-of-funds. See section 3 of the amended BAA for more specifics on eligibility information and guidelines for foreign participation.