

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)
GATEWAY PROGRAM**

**JUSTIFICATION FOR OTHER THAN FULL AND OPEN COMPETITION (JOFOC)
FOR THE MINIMAL HABITATION MODULE (MHM)**

1. FAR 6.303-2(b)(2) – The nature and/or description of the action being approved:

In August 2016, NASA selected six U. S. companies under the Next Space Technologies for Exploration Partnerships - 2 (NextSTEP-2) Broad Agency Announcement (BAA), Appendix A, Habitat Systems to help expand knowledge, commercial capabilities and opportunities in space by developing full-sized ground prototypes and concepts for deep space habitats.

NASA currently has a requirement to procure a module (full or partial) to be launched late calendar year 2023 for the NASA Gateway. In the interest of schedule, economy and efficiency, the procurement of the module will be pursued as a follow-on to the originally competitively awarded NextSTEP-2 BAA Appendix A, Habitat Systems studies. This justification provides the rationale for the following:

- a. NASA's decision to limit the number of responsible source(s) to one or more of the existing contracts already in place via the NextSTEP-2 BAA Appendix A, Habitat Systems to further mature requirements and system definition leading to the Design, Development, Test & Evaluation (DDT&E) and delivery to NASA of a module for the NASA Gateway which must be launched late 2023(See below); and
- b. NASA's decision, based on review of each NextSTEP-2 contractor's capabilities, to sole source the procurement of the MHM flight unit for the cislunar Gateway to Northrop Grumman Innovation Systems (NGIS) as a follow-on to the originally competitively awarded NextSTEP-2 BAA Appendix A, Habitat Systems studies, Contract NNH15CN76C (See below).

A) Use of existing contracts already in place via the NextSTEP-2 BAA Appendix A, Habitat Systems:

On December 11, 2017, the Space Policy Directive 1, of the President directed a change in national space policy that provides for a U. S.-led, integrated program with international and private sector partners for a human return to the Moon. On March 26, 2019, the President's mandate was reinforced by Vice President Pence, Chairman of the National Space Council, who tasked NASA with landing humans on the Moon's South Pole by 2024.

On May 30, 2019, NASA issued Synopsis Number: 80JSC019GTWYHAB informing the public of NASA's requirement to procure one or more module(s) for the NASA Gateway and its intent to use one or more existing contracts already in place via the NextSTEP-2 BAA Appendix A, Habitat Systems in order to meet the Gateway Program schedule.

The NextSTEP-2 Appendix A contractors have completed studies leading to definition of innovative mission architecture; substantiated their operational concepts; developed and tested ground prototypes; and demonstrated required core capabilities in multiple subsystems, including distributed avionics, modular power, redundancy management and autonomous operations. These efforts have positioned the NextSTEP-2 Appendix A contractors to expeditiously support the agency mandate to return to the Lunar vicinity and enable human exploration missions by 2024.

The decision to choose design(s) already matured under NextSTEP-2 Appendix A is made pursuant to FAR 6.302-1(a)(2)(ii)(A) and (B), which enables the use of other than full and open competition procedures in cases when the supplies or services required are deemed to be available from only one or a limited number of responsible source(s) and no other supplies or services will satisfy agency requirements. Supplies/Services may be deemed to be available only from the original source for the continued development and production of a major system or highly specialized equipment, including major components thereof, when it is likely that award to any other source would result in substantial duplication of cost to the Government that is not expected to be recovered through competition, or unacceptable delays in fulfilling the agency's requirements.

Due to the time and expense required to design and fabricate a human-rated deep space module, it is necessary for NASA to begin development activity as quickly as possible and be able to leverage the work already accomplished under Appendix A of the NextSTEP-2 BAA. Over the past three years, NextSTEP-2 BAA contractors have extensively developed initial designs and operational concepts for establishing a Gateway station in lunar orbit.

NASA's schedule analysis has shown that development, fabrication, testing and launch of a MHM for Gateway using existing assembly lines with minor modifications and use of existing tooling should take approximately three years. A design at the Critical Design Review stage (no new technologies, new tooling required) would take four years, while a design at the System Requirement Review stage (no new technologies) would take five years. Furthermore, a new full and open competition would cause an additional delay of 12-18 months or more in fulfilling the agency's requirements.

In order to support the mandate to enable a human landing capability in 2024, the MHM must be launched in late 2023 to be delivered to Gateway no later than early 2024. The schedule constraints established by a December 2023 launch dictate that a module be on dock at Kennedy Space Center in mid-2023 for launch processing and integration. Per NASA's schedule analysis, this typical timeline for module production must already be compressed in order to achieve the 2024 human lunar landing deadline. Given that the NextSTEP-2 contractors advanced designs to a near System Design Review (SDR) fidelity, NASA determined that it must utilize the existing concepts from the NextSTEP-2 Appendix A and use the development done to date to minimize the additional design work necessary to produce a module in time.

In addition, award to any other source may result in substantial duplication of cost to the Government that is not expected to be recovered through competition. NASA has invested

\$87M to date plus substantial GFE expenses in partnered activities with the vendors in advancing these capabilities.

For these reasons, NASA has decided to limit the number of responsible source(s) to one or more of the existing contracts already in place via the NextSTEP-2 BAA Appendix A.

B) Sole Source of the MHM to NGIS:

The planned Gateway lunar orbiting platform is critical for staging human exploration missions to the lunar surface by 2024 as mandated by Vice President Pence, Chairman of the National Space Council. The Gateway platform will include a pressurized habitation module with environmental control and life support systems to house astronauts during lunar missions. To accomplish a lunar landing, astronauts aboard an Orion Spacecraft will launch toward the moon on an SLS rocket, rendezvous with Gateway (with the MHM) in a lunar orbit, and descend to the lunar surface via a crewed lander by 2024.

In order to meet NASA's 2024 human lunar landing deadline, NASA examined the existing NextSTEP-2 contractors' concepts for deep space habitation modules. As stated in the synopsis (80JSC019GTWYHAB), not all contractors currently performing services via the NextSTEP-2 BAA Appendix A, would be selected to receive an award for this next phase and additional phases. Each contractor's proposed approach, progress, and capabilities were reviewed and assessed by NASA for potential use as a MHM. In order to meet the Gateway Program's schedule and support the Vice President's 2024 human lunar landing mandate, NASA determined it was necessary to continue to work with NGIS for these highly specialized services. NGIS was the only NextSTEP-2 contractor with a module design and the production and tooling resources capable of meeting the 2024 deadline.

There are three primary considerations, when combined, which establish NGIS as the provider uniquely capable of delivering the MHM in time to support the 2024 lunar surface mission. No other NextStep-2 provider has these existing capabilities which, when considered collectively, provide the only viable approach to successfully achieving the 2024 lunar mandate:

- *Existing Production Capability:* Through its NextSTEP work, NGIS developed Gateway solutions based upon its Cygnus Cargo resupply module. NGIS has an existing production capability of the Cygnus through a combination of corporate-owned designs and manufacturing assets, including unique tooling, as well as an exclusive contract with an established spaceflight module construction firm.
- *Critical Subsystem Maturity:* NGIS has already advanced design & development for other critical components adapted to the Cygnus, specifically radial docking ports and body mounted radiators (BMRs). NGIS and its contractor for spaceflight module construction have analyzed options to near System Requirements Review (SRR)/ System Definition Review (SDR) level of maturity for integrating radial docking ports into a Cygnus primary structure, thereby reducing the schedule risk associated with modified structural developments. Similarly, Cygnus-specific BMRs are at a CDR level of maturity, with design and qualification expected to be applicable to use on the MHM.

- *Existing LV Fairing Accommodation:*

The diameter of the Cygnus module supports the Gateway programmatic requirement to be compatible with existing commercial launch vehicle providers' fairings, thereby mitigating the schedule and cost risk that would be associated with launch providers having to develop and manufacture new fairings.

Existing Production Capability

NGIS is the only NextSTEP-2 contractor uniquely able to complete design, development and production of the MHM within the time necessary to launch in late 2023 and get the module on station in lunar orbit early 2024 using existing launch vehicles. NGIS has an existing, active pressurized module manufacturing capability via their ongoing Cygnus module construction subcontractor that has provided experience and lessons learned from development of 13 Cygnus vehicles to date, refining management and technical interactions and interchanges. This existing contractual relationship and its associated production pedigree are critical to timely development progress and problem resolution, which are substantive mitigations to schedule risk. This production relationship is unique to NGIS among the NextSTEP-2 vendors, and can be highly leveraged to achieve successful DDT&E and timely delivery of the MHM.

Critical Subsystem Maturity

The Cygnus module design can be adapted to provide the structural basis for the MHM. In addition to the existing fundamental design, during the NextSTEP-2 activities NGIS and its contractor for spaceflight module construction have been designing modifications for inclusion of radial docking ports which would enable multiple visiting vehicles to attach to the MHM simultaneously, thus enabling the lunar landing architecture to be implemented initially with the MHM serving as the sole transfer node for the 2024 mission.

The Gateway module will also have to reject heat generated by its own powered systems. Given that body mounted radiators are already in development specifically for the Cygnus module, the development of the critical thermal control subsystem is substantially advanced. Design modifications to enable BMRs to cover more surface area of an extended Cygnus structure are readily viable and provide flexibility in the implementation of the Gateway power and avionics architectures and also reduces schedule risk. These advanced docking port and thermal development activities further position NGIS as the only NextSTEP-2 contractor with the capability to produce an integrated module to meet the December 2023 launch schedule.

Existing LV Fairing Accommodation

In order to meet the 2024 deadline, NASA must use existing commercial launch vehicles to transport a MHM to lunar orbit for integration into Gateway in time to support the Vice President's mandate. Through the existing manufacturing capability previously described, NGIS has tooling and manufacturability for production of a module with a diameter that can be uniquely accommodated by existing Commercial Launch Vehicle fairings, while still supporting radial docking or externally-mounted hardware. While other common module diameter sizes could potentially be fabricated with already built tooling, those larger diameters would not accommodate radial docking ports as required.

Additionally, the smaller diameter of the NGIS module enables other externally mounted capabilities, including batteries, communication antennae, and payloads to be incorporated upon launch and available for the initial mission. These capabilities uniquely establish a minimum risk development posture for supplying the initial docking and habitable transfer capability necessary to support lunar operations in 2024.

Lastly, a new full and open competition would cause an additional delay of 12-18 months or more in fulfilling the agency's requirements.

2. FAR 6.303-2(b)(3) – A description of the supplies or services required, to meet the Agency's needs (including the estimated value):

NASA has a requirement to procure a MHM for the NASA Gateway that will meet the Gateway Program schedule and support the President's mandate through the U. S. Space Council to return to the Lunar vicinity, enable human exploration missions by 2024.

The required MHM must be a functional pressurized volume providing sufficient command, control & data handling capabilities, energy storage and power distribution, thermal control, communications and tracking capabilities, environmental control and life support systems to augment the Orion spacecraft and support a crew of four for at least 30 days; two axial and up to two radial docking ports; stowage volume; and utilization capabilities.

Of the NextSTEP-2 contractors, NASA determined that only NGIS could complete the work in time for a December 2023 launch because of their existing production capability in partnership with its spaceflight module construction contractor, their advancement of critical docking port and thermal control system designs directly applicable to the existing Cygnus primary structure design, and the capability of their module to be launched while encapsulated within an existing commercial launch vehicle fairing. The combination of these development activities and existing capabilities establish NGIS as uniquely qualified to produce the MHM within the required schedule.

This effort is anticipated to have a 5-year base period (September 1, 2019 – August 31, 2024) to allow for delivery of the module to the Gateway; and two, 1-year options (September 1, 2024 – August 31, 2025) and (September 1, 2025 – August 31, 2026) for checkout of the module's systems and continued contractor support for autonomous and human-tended operations, including the first lunar landing sortie from Gateway.

The total value of this effort is estimated to be approximately [REDACTED] for the MHM.

3. FAR 6.303-2(b)(4) – An identification of the statutory authority permitting other than full and open competition:

The statutory authority for this JOFOC is 10 U. S. C. 2304(c)(1) as implemented by Federal Acquisition Regulation (FAR) 6.302-1(a)(2)(ii)(A) and (B), which enables the use of other than full and open competition procedures in cases when the supplies or services required are deemed to be available from only one or a limited number of responsible source(s) and no

other supplies or services will satisfy agency requirements. Supplies/Services may be deemed to be available only from the original source for the continued development and production of a major system or highly specialized equipment, including major components thereof, when it is likely that award to any other source would result in substantial duplication of cost to the Government that is not expected to be recovered through competition, or unacceptable delays in fulfilling the agency's requirements.

As previously stated, awarding to any other source would result in substantial duplication of cost to the Government that is not expected to be recovered through competition. NASA has invested over \$18M with NGIS in developing its unique module habitation concepts. Additionally, NGIS has advanced their uniquely proposed designs to a near System Definition Review (SDR) fidelity which, if it were not leveraged, would result in unacceptable delays in fulfilling the agency's requirement.

When it comes to the selection of NGIS for the MHM, per NASA's analysis, NGIS is the only contractor that can provide the MHM essential to meeting the minimum Gateway habitation requirements while meeting the 2024 lunar landing schedule. Conducting a new full and open competition to enable the consideration of any other contractor, would cause unacceptable delays of at least 12-18 months. Similarly, conducting additional competition among the NextSTEP-2 contractors would induce unacceptable delay of up to 6 months. Beyond the procurement delay, an additional delay of 6-12 months or more would be required to reach sufficient design maturity to begin fabricating the tooling necessary to then manufacture the module. Rushing the design and development processes to meet schedule introduces unacceptable risk that the resultant module would not meet the minimum requirements for astronaut habitation needed to support the 2024 lunar landing mission.

4. FAR 6.303-2(b)(5)&(9) – A demonstration that the proposed contractor's unique qualifications or the nature of the acquisition requires use of the authority cited and any other facts supporting the use of other than full and open competition such as:

NASA has a requirement to procure a MHM for the NASA Gateway that will meet the Gateway Program schedule and support the agency mandate to return to the Lunar vicinity, enable human exploration missions by 2024.

The required MHM must be a functional pressurized volume providing sufficient command, control & data handling capabilities, energy storage and power distribution, thermal control, communications and tracking capabilities, environmental control and life support systems to augment the Orion spacecraft and support a crew of four for at least 30 days; two axial and up to two radial docking ports; stowage volume; and utilization capabilities. The MHM will be launched in Q4 CY23. The module must be capable of being launched using a commercial launch vehicle and therefore must be sized to fit within existing fairing envelope dimensions.

NGIS is uniquely positioned to deliver the required module within the schedule and technical constraints identified as demonstrated below and discussed more fully in Section 1.B.

NGIS:

- Has an existing, active pressurized module primary structure manufacturing capability via their ongoing Cygnus module production that can be adapted to provide the structural basis for the MHM, uniquely providing a capability to meet the December 2023 launch schedule necessary to support Lunar surface operations in 2024.
- Has existing tooling and manufacturability for development of a module with a diameter that can be accommodated by existing CLV fairings (Cygnus diameter is 3m), while still supporting radial docking or externally-mounted hardware, uniquely establishing a minimum risk development posture for supplying the initial docking and habitable transfer capability necessary to support lunar operations in 2024.
- Has developed and demonstrated habitat module concept designs through NextSTEP Phase 1 and 2 approaching SRR and SDR maturity and in some areas, beyond SRR/SDR fidelity; enabling them to meet Gateway schedule requirements that are responsive to Agency mandates.

5. FAR 6.303-2(b)(6) – A description of the efforts made to ensure that offers are solicited from as many potential sources as practicable, including whether a notice was or will be publicized as required by Subpart 5.2 and, if not, which exception under 5.202 applies:

Pursuant to FAR 5.201(b)(1); Synopses of Proposed Contract Actions, General; the proposed contract action was synopsized via the Government Point of Entry (GPE). The website for the GPE is the Federal Business Opportunities (FedBizOpps) website is located at <https://www.fbo.gov>.

On May 30, 2019, a Special Notice was posted to the GPE, which provided notification of the Government's requirement to procure one or more module(s) (full or partial) for the NASA Gateway. The Special Notice also included a statement that interested organizations may submit their capabilities and qualifications to perform the effort on schedule and without resulting in substantial duplication of cost to the government.

The Special Notice stated the Government's intent to execute Justification(s) for Other than Full and Open Competition to limit the number of responsible source(s) to one or more of those sources already engaged in the NextSTEP-2 BAA Appendix A, Habitat Systems to further mature requirements and system definition leading to DDT&E and delivery to NASA of one or more module(s) (full or partial) for the NASA Gateway.

The NextSTEP-2 Appendix A contractors' concepts were assessed for potential use as a Minimal Habitat. Northrop Grumman was the only contractor with concepts and the development and production capability that met both requirements and schedule.

6. FAR 6.303-2(b)(7) – A determination by the contracting officer that the anticipated cost to the Government will be fair and reasonable:

Upon approval of this justification, a Request for Proposal will be issued to NGIS. NGIS will submit a proposal that will be evaluated and negotiated by the Government. A cost and price analysis will be performed in accordance with FAR 15.404-1(a) (3), Proposal Analysis

Enclosure

Techniques, to verify that the overall price is fair and reasonable. Also, in accordance with FAR 15.403-4, Requiring Certified Cost or Pricing Data, NGIS will be required to execute a Certificate of Current Cost or Pricing Data when a fair and reasonable price based upon NGIS proposal is agreed upon.

7. FAR 6.303-2(b)(8) – Description of the market survey conducted, and the results, or a statement of the reasons a market survey was not conducted:

As part of our market survey, a synopsis was issued on May 30, 2019. The synopsis closed on June 13, 2019, and the Government did not receive any qualification and capability statements.

8. FAR 6.303-2(b)(10) – A listing of the sources, if any, that expressed an interest in writing in the acquisition:

See item #7

9. FAR 6.303-2(b)(11) – A statement of actions, if any, the agency may take to remove or overcome any barriers to competition before any subsequent acquisition for the supplies or services required:

Follow-on acquisitions are undetermined at this time.