Call 003 –Payload Reentry from Space

Development and Demonstrations

11 March 2024

Rocket Experimentation for Global Agile Logistics (REGAL)

THIS WILL BE A TWO-STEP SOLICITATION.

First Step: White papers will be accepted any time after 8:00am Wright-Patterson AFB, OH local time on 11 March 2024 and before 4:00pm Wright-Patterson AFB, OH local time on 31 March 2027**. Only white papers are due at this time.**

Second Step: To be provided in the Requests for Proposals sent to offerors that submit White Papers considered to meet the needs of the Department of the Air Force.

Delivery Instructions: In accordance with the ARA, FA8650-21-S-9307, please adhere to the following delivery instructions.

The DAF requests electronic proposals be submitted using BOTH DoD SAFE (primary method) and email (backup method) to the following addresses:

AFRL.RS.RocketCargo@us.af.mil

The maximum email file size the Government can receive is 20 MB.

If the contractor needs a DoD SAFE drop-off invite from the DAF, please send that request to AFRL.RS.RocketCargo@us.af.mil no later than 7 days prior to the due date of proposals to ensure a drop off code is provided in a timely manner.

NOTE: Any proposal received at the Government Office designated in this ARA or subsequent Calls after the exact time specified for receipt of offers is "late" and will not be considered except at the discretion of the Government. Early proposal submissions are encouraged.

Anticipated Award Date: Variable, depending on proposal submission date. See below, Section 4 Schedule / Period of Performance

Anticipated Number of Awards: Estimate 2 or more awards

Anticipated Funding: See below, Section 6 Cost Objective/Funding Constraint

Advanced Research Announcement: FA8650-21-S-9307

1. Statement of Objectives (SOO)/Description of Technical Areas

A. Background/Scope:

The Air Force Research Laboratory Integrated Capabilities Directorate (AFRL/RS), working with the United States Space Force Assured Access to Space (USSF/AATS), is seeking concepts and detailed designs to enable the return of significant quantities of material from space in a middle capability range between current sample-and-return technology and the higher downmass system like NASA Space Shuttle and the developmental DAF Rocket Cargo capability.

On the small payload size, NASA and industry have matured multiple technological approaches, however the payload downmass is generally 100kg or less and the reentry capsules have a mass about 250X higher than the payload delivered (250:1 mass fraction). On the large payload size, Space Shuttle was designed to downmass 14 Tons using an 83 Ton vehicle (6:1 mass fraction). However, Space Shuttle is no longer available and was also not practical for lost cost material delivery due to the human-rating of the vehicle. The Rocket Cargo capability currently in development under AFRL and USSF is seeking a 100 Ton downmass capability using a 120 Ton SpaceX STARSHIP vehicle (1.2:1 mass fraction). Although the 100-Ton material transport capability in development under Rocket Cargo creates innovative capability for the DOD, and is an excellent pathfinder for a future material transport capability, the initial approach also has significant limitations.

- For some missions, delivering the full 100-Tons to one location creates a secondary distribution requirement at the delivery location. In these cases, it would be preferrable to distribute the 100 Tons across several locations in a theater.
- The current approach leverages a specific space launch rocket provided from one industry vendor (Starship from SpaceX). USSF and AFRL seek to extend the vendor base in order to increase access to a wider range of launch pads, launch locations, and increased competition between launch providers.
- For some missions, 100 Tons capacity is excessive. Therefore, DAF seeks to expand the Rocket Cargo capability to support payloads in the 5-10 Ton class.

This effort is an extension of the overall approach for establishing DOD material transport through space for DoD resupply using space launch rockets, as described in Advanced Research Announcement (ARA) FA8650-21-S-9307.

Multiple technical challenges and viable approaches to solve those challenges may be responsive to this call. Industry is encouraged to consider heat shield that can be adapted onto DOD-supplied cargo containers, or vehicle-agnostic downmass systems that are sized to carry a range of DOD cargo in the 5-10 Ton range.

Key technical parameters are:

- Solutions that are not specific to one launch vehicle. Ideal solutions will be launchable on a wide range launch providers that can be used for DOD payloads.
- Minimum capacity near that of an ISU-90 shipping container (10 foot cube with 5 tons capacity). Preferred capability is the objective of a TEU shipping container (10 foot x 10 foot x 20 foot with 10 ton capacity)
- Capacity significantly below the ISU-90 equivalent are not of interest for this solicitation.
- The systems must be launch-vehicle agnostic without significant modification.
- Offerors can consider cases where their reentry system provides the orbital change to a reentry trajectory, or cases where that delta-V is provided by the launch vehicle or separate government provided system.
- Offerors may propose approaches that integrate a terrestrial landing capability for the container, or ask that it be provided by the government (eg parachutes or JPAD equivalents).
- The key element for this solicitation is that the offeror must provide a viable design for the thermal protection system that can downmass this class of payload through reentry.
- In all cases, DOD seeks to ship existing material without modification. Designs cannot require DOD hardware to be specialized in order to use the rocket transport mode.

Vendors can consider attachments (eg, heat shields) that can be attached to government-supplied containers to enable reentry, or design full containers or capsules that can contain the desired material mass and volume and be launched on space launch rockets. AFRL currently has containers in development that are designed to carry DOD cargo safely through the space flight. In either approach, the key parameters of interest are mass efficiency, volumetric efficiency, speed of launch, speed of distribution at the delivery locations, and overall delivery cost per Ton.

Offerors with approaches that do not fit the key technical parameters described herein are encouraged to discuss the idea(s) with the Technical Point of Contact (TPOC), whose contact information is found in Section 11 of this call, prior to developing a full proposal.

B. Technical Objectives: The Government seeks innovative designs to meet the following technical objectives:

   a. Design vehicle-agnostic downmass system that can potentially achieve the DOD performance goals. (min 10’ cube, 5 Tons, goal is 10x10x20’ container with 10 Ton capacity)
   b. Analyze the reentry physics to determine a suitable design or the reentry thermal protection system (materials, trajectory, heat rates, etc)

c. Consider trade space between orbital and sub-orbital trajectories for deployment.
d. Concept design for an end-to-end test/demo the capability of vehicle agnostic deorbiters to deliver payloads to remote terrestrial locations. The actual experiment, if approved, would be additional funding on a follow-on contract.
e. Perform a low-fidelity manufacturing assessment of the concept design to estimate achievable manufacturing rates and schedule. Identify manufacturing capability that would be needed to achieve these rates.
f. Develop a system design for the full capability. The design shall have sufficient fidelity to warrant a follow-on fabrication and test effort with reasonable risk. The design shall include cost and schedule estimates in addition to the technical approach.
g. Offerors do not need to address launch vehicle and systems challenges such as range clearance, weather, winds aloft, reentry risk as part of this effort.

2. Deliverable Items

A. Data Items: Negotiable. Concept design for the material downmass system with sufficient fidelity to enable DOD to make an informed decision on a follow-on effort for fabrication and test, as described above.

B. Software: Negotiable.

C. Hardware: Negotiable. Test hardware to validate the thermal protection or cargo compatibility are encouraged but not required.

D. Other: Not anticipated.

E. Final Report and Technical reports describing test results.

3. Data Rights Desired

The government desires Unlimited Rights for all technical data, non-commercial software (NCS), and NCS documentation developed using government funds, however due to the desired use of commercially-developed rocket systems in this program, more restrictive data rights are anticipated and will be considered where appropriate. The desired, but negotiable, data rights are:

(1) Technical Data: Unlimited Rights
(2) Non-Commercial Software (NCS): Unlimited Rights
(3) NCS Documentation: Unlimited Rights
(4) Commercial Computer Software Rights: Customary License

4. Schedule/Period of Performance

The technical period of performance for any individual effort under this solicitation is estimated to be approximately 12-18 months. An additional three (3) months are allocated for preparation and review of the final report, resulting in an overall estimated period of performance of approximately 15-21 months. This period of performance is provided as an estimate only. Offerors should propose a schedule that is executable and maximizes the probability of achieving the technical objectives of this call.

The following dates represent desired limits on the earliest start date and latest end date for technical efforts under this call.

Project Kickoff: No earlier than June 2024

End of Technical PoP: No later than December 2027

5. Government Furnished Property/Equipment

Offerors should clearly define any required government support. Potential support will be determined by contract or agreement.

The locations at which this support and these items will be available, and the durations for which they will be available, will be determined based on availability, government discretion, and the offeror's request. Offerors should note in their proposal the anticipated timeframe when access to Government support will be desired.

6. Cost Objective/Funding Constraint

The government anticipates multiple awards (potentially 2 or more), each with a value of approximately $1M. However, the value of the award will reflect the scope of work proposed.

7. OPSEC/Safety/Classification

A. OPSEC: General Operations Security (OPSEC) procedures, policies and awareness are required to reduce program vulnerability from successful adversary collection and exploitation of critical information. OPSEC will be applied throughout the life cycle of any award resulting from this solicitation. The Critical Information & Indicators List (CIIL) and the OPSEC Plan will be provided upon request by AFRL DSO Security Manager Office for awards resulting from this solicitation. While working on the government installation, OPSEC guidance and OPSEC training will be provided by AFRL DSO Security Manager Office. This training will ensure contractors are familiar with CIIL and OPSEC Plan as it pertains to their contract.

B. SAFETY**:** The following requirements must be incorporated into awards resulting from this call:

a. Must comply with all federal, state, local, and DAF safety and environmental regulations.
b. Must comply with system safety requirements contained in MIL-STD 882E, Section 4 "General Requirements" for any deliverable systems or hardware. Must identify safety-critical components of those systems or hardware, and software interfaces with those components. Must test and verify the safety-critical hardware and software for safety acceptance.

C. PROGRAM SECURITY CLASSIFICATION: Activities under this Call are **expected to be unclassified**, however classified activities may be possible, and will be addressed accordingly. If a DD254 is applicable, offerors must verify their Cognizant Security Office information is current with the Defense Counterintelligence and Security Agency (DCSA) at www.dcsa.mil.

8. White Paper / Proposal Submission

A. Overview: This Call consists of a two-step submission process described in detail below. White Papers/Proposals submitted shall be in accordance with this call and the ARA (FA8650-21-S-9307). The Government intends to review white papers/proposals and award some, all, or none of the proposals received without negotiation/discussion; however, the Government reserves the right to negotiate with those offeror(s) whose proposal is selected for funding.

ONLY WHITE PAPERS ARE BEING SOLICITED AT THIS TIME.

Offerors should be alert for any amendments that may permit extensions to the white paper submission date.

B. First Step (White Paper) Instructions:

a. General: The First Step requests a white paper and a rough order of magnitude (ROM) cost. The white paper shall include a discussion of the nature and scope of the research and the offeror's proposed technical approach. The Government will review the white papers in accordance with the First Step Peer or Scientific Review criteria, set forth below. Based on this review, the Government will determine the white papers which have the potential to best meet the DAF needs. Offerors will be notified of the disposition of their white paper. It is anticipated that Government review of the white papers submitted will take 10 working days. Those offerors submitting white papers assessed as meeting DAF needs will be asked to submit a technical and cost proposal. Those offerors not requested to submit a technical and cost proposal will be

notified but may, however, still elect to submit a technical and cost proposal. An offeror submitting a proposal without first submitting a white paper will still be eligible for an award. However, it is recommended that a white paper be submitted first to save time and resources. Proposals must be submitted before 1 July 2027. The cost of preparing white papers in response to this Solicitation is not considered an allowable direct charge to any resulting or any other contract or agreement; however, it may be an allowable expense to the normal bid and proposal indirect cost as specified in FAR 31.205-18.

b. Page Limitation: The White Paper shall be limited to 6 pages, prepared and submitted in Word format. Font shall be standard 10-point business font Arial. Character spacing must be "normal," not condensed in any manner. Pages shall be double-spaced (must use standard double-space function in Microsoft Word), double-sided (each side counts as one page), 8.5 by 11 inches, with at least one-inch margins on both sides, top and bottom. All text, including text in tables and charts, must adhere to all font size and line spacing requirements listed herein. Font and line spacing requirements do not have to be followed for illustrations, flowcharts, drawings, and diagrams. These exceptions shall not be used to circumvent formatting requirements and page count limitations by including lengthy narratives in such items. Pages shall be numbered starting with the cover page being Page 1, and the last page being no greater than Page 6. The page limitation covers all information including indices, photographs, foldouts (counted as 1 page for each 8.5 by 11 portion) tables, charts, appendices, attachments, resumes, etc. The Government will not consider pages in excess of these limitations. Offerors should adhere to the delivery instructions specified in the ARA.

c. Format: The white paper will be formatted as follows:

(i) Section A: ARA and call Number, Title of Program, Name of Company, Business Size, Company's Commercial and Government Entity (CAGE) number, Dun & Bradstreet (D&B) Data Universal Numbering System (DUNS) number, Contracting POC and Technical POC with appropriate telephone numbers, fax numbers, and email addresses for the POCs.
(ii) Section B: Period of Performance and Task Objectives;
(iii) Section C: Technical Summary and Proposed Deliverables; and
(iv) Section D: Cost of Task (Rough Order of Magnitude (ROM).

d. Technical Portion: The technical portion of the white paper shall include a discussion of the nature and scope of the research and the offeror's proposed technical approach/solution. It may also include any proposed deliverables. Resumes, descriptions of facilities and equipment, a proposed Statement of Work are not required at this point.

e. Cost Portion: The cost portion of the white paper shall include a ROM cost estimate. No detailed price or cost support information should be

forwarded; only a time-phased bottom line figure should be provided.

f. Other Information: Multiple white papers within the purview of this announcement may be submitted by each offeror. If the offeror wishes to restrict its white papers, they must be marked with the restrictive language stated in FAR 52.215-1(e).

g. White Paper/Proposal Content Summary: You may be ineligible for award if all requirements of this solicitation are not met on the proposal due date.

C. Second Step (Proposal) Instructions: Based on a review of the white paper a proposal may be recommended. The Second Step consists of offerors submitting a technical and cost proposal in accordance with the instructions in the ARA (FA8650-21-S-9307) and this call. The technical proposal is limited to 25 pages. This page limitation does not apply to the Statement of Work (SOW). The SOW has no page limitation. All other required information regarding the proposal submission requirement is captured in the ARA. After receipt, proposals will be reviewed in accordance with the award criteria in this call.

9. White Paper / Proposal Review Information

A. First Step – White Paper Peer or Scientific Review Criteria: The Government will review White Papers to determine which of them have the potential to best meet DAF needs based on the following criteria, which are of equal importance:

(1) Soundness of the offeror's technical approach to accomplish the technical objectives.

(2) Relevance and impact of the proposed technical effort to the overall goals of the ARA and Call.

(3) Affordability (Proposed ROM Cost Estimate).

B. Second Step – Proposal Peer or Scientific Review Criteria: Proposals will be reviewed against the criteria listed below. The technical aspect is ranked as the first order of priority.

a. Technical: The technical aspect shall be reviewed based on the following criteria that are of equal importance.

(1) Unique and innovative approach proposed to accomplish the technical objectives. New and creative solutions and/or advances in knowledge, understanding, technology, and the state of the art.
(2) The offeror's understanding of the scope of the technical effort.
(3) Soundness of the offeror's technical approach including

whether the proposal identifies major technical risks, clearly defines feasible mitigation efforts, and demonstrates related experience and qualifications of technical personnel.

(4) The potential to transition the research and development deliverables to future Government needs. Any proposed restriction on technical data or computer software will be considered.

b. Cost/Price: The cost evaluation includes the realism of the proposed cost. Cost/Price is a substantial factor, but ranked as the second order of priority. (If an offeror proposes the use of GFP other than any GFP identified in the ARA, and that proposed GFP provides the offeror an unfair competitive advantage, then FAR 45.202 requires rental equivalent be applied to the Cost Factor for evaluation purposes only).

C. Review and Selection Process

a. Categories: Based on the Peer or Scientific Review, proposals will be categorized as Selectable or Not Selectable (see definitions below). The selection of one or more sources for award will be based on the Peer or Scientific Review, as well as importance to agency programs and funding availability.

(1) **Selectable:** Proposals are recommended for acceptance if sufficient funding is available

(2) **Not Selectable:** Even if sufficient funding existed, the proposal should not be funded.

Note: The Government reserves the right to award some, all, or none of proposals. When the Government elects to award only a part of a proposal, the selected part may be categorized as Selectable, though the proposal as a whole may not merit such a categorization.

b. No other criteria will be used.

c. Prior to award of a potentially successful offer, the Agreement Officer will make a determination regarding price reasonableness.

10. Award Administration Information

A. Award Notices: Offerors will be notified whether their proposal is recommended for award on or about 30 working days from date of proposal submission. The notification is not to be construed to mean the award is assured, as availability of funds and successful negotiations are prerequisites to any award.

B. Administrative and National Policy Requirements: Refer to the ARA.

C. Reporting: For reporting requirements and frequency, refer to Section 2.

11. Agency Contact for this Call

Address questions to: AFRL.RS.RocketCargo@us.af.mil

12. Miscellaneous

A. Intergovernmental Review: N/A
B. Other Submission Requirements: N/A