NATIONAL ACADEMIES Sciences Engineering Medicine

September 27, 2022

To: Interested Responders

Re: Request for Information (RFI)

The National Academy of Sciences ("NAS") is requesting information regarding research support for a study entitled ***Independent Technical, Risk, and Cost Evaluation (TRACE) for the National Academies of Sciences, Engineering, and Medicine's Decadal Survey for Solar and Space Physics (Heliophysics) 2024-2033.*** NAS invites all interested responders to submit a written response to this Request for Information ("RFI").

This RFI is being sought strictly for the purpose of gaining knowledge of responders and capabilities available within a fast-track timeframe and should not be construed as intent, commitment, or promise to acquire services, support, or solutions offered. Submitting to this RFI is neither a disqualifier nor a guarantor of future work. No contract is guaranteed as a result of any response to this RFI.

Information submitted in response to this RFI will become the property of NAS.

NAS will not pay for any information or consultations herein requested, nor is it liable for any cost incurred by the responder.

RFI responses must be sent to dyee@NAS.EDU no later than Tuesday, October 18, 2022.

Procedural, administrative, or contractual questions and answers may be directed to the email listed above. Technical or requirement questions may be directed to Mia Brown at mbrown@nas.edu.

We appreciate your attention to this matter.

Sincerely yours,

Kevin Hale Digitally signed by Kevin Hale
Date: 2022.09.27 05:32:46 -04'00'

Kevin Hale,
Director, Procurement Services & Subaward Administration

National Academy of Sciences

Request for Information (RFI)

RFI: NAS-RFI-DEPS-2022-01

Independent Technical, Risk, and Cost Evaluation (TRACE)[1] for the National Academy of Sciences, Engineering, and Medicine's Decadal Survey for Solar and Space Physics (Heliophysics) 2024-2033 (the "Survey")

1. INTRODUCTION

The National Academy of Sciences ("NAS"), under sponsorship of the National Aeronautics and Space Administration ("NASA"), the National Science Foundation ("NSF"), and the National Oceanic and Atmospheric Administration ("NOAA") has established the Steering Committee for the Decadal Survey for Solar and Space Physics (Heliophysics) ("the Committee"). Broadly, the Committee will generate consensus recommendations to implement a comprehensive strategy and vision for a decade of transformative science at the frontiers of solar and space physics. Implementation and investment recommendations specific to the agency sponsors will be described in the final report. To support this goal, NAS intends to contract with an independent organization to assess the technical readiness, risk evaluation, and cost estimation of mission concepts. This process is called the Technical, Risk, and Cost Evaluation (TRACE). Because most of the project concepts are pre-phase A, TRACE provides a "box" of cost and schedule ranges. The successful organization will support the Committee and its panels in gathering the requisite information and providing the necessary TRACE analyses to support the prioritization of projects and technical development activities for the coming decade.

A key objective of the Survey is to develop a comprehensive research strategy to advance the frontiers of solar and space physics that will include identifying, recommending, and ranking the highest priority research activities — taking into account for each activity the scientific case, international and commercial activities, and opportunities for partnerships. Where feasible and useful, such factors as timing, cost category and cost risk, technical readiness, and technical risk, will also be considered. Establishing a profile (estimated cost box and estimated schedule) of a project equates to developing a preliminary plan fitting within the available projected project budget. The

[1] Formerly known as Cost and Technical Evaluation (CATE), the name is updated to better reflect the risk-based nature of the evaluation.

entire life cycle of the project must be scoped, including design, technology development, construction, operation, and extended mission costs. In addition, the contractor will support the Committee by reacting rapidly to contingency scenarios requested to develop various descope/rescope options, including budget and technical uncertainties.

2. Purpose

The purpose of this RFI is to solicit interest and receive information on the capabilities from organizations that have the expertise to support the Survey's activities described below. The Survey will prioritize space-based planetary science mission concepts. NAS is seeking a single contractor to provide the tasks listed below for mission concept studies. If the contractor does not have the necessary expertise itself, it must describe how it will augment its capabilities to support the full scope of programs to be considered by the Survey.

This RFI provides background information and describes the services desired for the contract. Although the RFI establishes the basis for responder proposals, the detailed obligations and additional measures of performance will be defined in future requests and any resultant contract.

3. TASKS

The Contractor will support the Survey by carrying out the following tasks:

3.1 Task 1: Gather Information on Mission Concepts

The Committee will request information from teams proposing projects for Survey consideration. This information, along with public documents and other materials, will be provided to the contractor, unless NAS determines that permitted restrictions apply on the distribution of the data. The contractor, in consultation with the Survey Committee, may request additional supplemental information where it is necessary to fully assess the technical readiness, risk, schedule, and cost scope of the activity. In some cases it may be necessary to support the Committee by developing alternative implementations, including the conversion of a project into a technology development program.

3.2 Task 2: Estimate Budget Scope and Schedule for Proposed Activities

Contractor shall select the methodology for assessing the budget scope and schedule for each activity set. Contractor shall assure that methods and tools utilized are appropriate for conceptual level assessments and will cross-check model results with analogy-based cost and schedule estimates to provide robust estimates from multiple independent

sources for each activity. Contractor may request data from the sponsor (NASA) and Committee, however, the contractor's cost estimating methodology and basis of estimate shall remain independent from the cost estimates provided by government agencies. Contractor shall validate its budget estimates through an independent method.

3.2 Task 3: Assess Concept Technology Readiness and Risk

Contractor shall identify, as appropriate, programmatic risks associated with the key considerations such as technology development requirements, spacecraft/flight systems, instrumentation, campaign/project/facility design, and mission operations. Contractor shall assess technology readiness and assign low, medium or high-risk ratings based on the technology maturity level of the concept. Contractor shall then associate each of the aforementioned considerations with a cost and schedule impact, and incorporate these into the cost and schedule estimates. This activity will be carried out in collaboration with subject matter experts on the Committee and its supporting panels.

3.3 Task 4: Summary and Comparison of Data

Contractor shall develop a series of top-level quad-charts for each activity concept using these four quadrants: a) activity description including technology development requirements, b) cost and schedule estimates, c) funding profile, and d) technology readiness and risk rating. Contractor shall also provide an "S-curve" that is generated by the cost model on a separate chart for the Committee's consideration. The quad-charts will provide a top-level snapshot of each concept for summary purposes and an overview of its technical, risk, schedule, and cost issues and merits; and expected budgeting requirements. All information provided in the quad-charts is to be supported by contractor's independent analysis.

3.4 Task 5: Develop Tools for Budget Analysis

The contractor will also provide a clear and independent validation methodology developed for analyzing the consistency of the set of recommended activities with the expected budgets of the U.S. federal agencies and other organizations who would be sponsoring the proposed project. The contractor will support the Survey Committee, using these tools, to develop a set of scenarios for phasing and implementing a set of activities consistent with the predicted budget profiles. In addition, the contractor should be ready to conduct re-examination of a small subset of the original TRACE analysis, to explore variations of the originals (i.e., descopes and rescopes), with a fast turnaround.

3.5 Considerations for All Tasks

The contractor will have the capability and resources to conduct the technical and budgetary analyses needed to evaluate a variety of mission concepts at all phases of development and maturity. In particular, the contractor will have the capability to:

1. Analyze space-based concepts utilizing single platforms or constellations of smaller spacecraft—that may be implemented in low-, medium-, or geostationary-orbit; and
2. Evaluate the impact on particular concepts of actions ranging from increased investments (upscopes) to reduced investments (descopes), which may also include proof of concept missions.

3.6 Reporting

The contractor shall develop a final report that consists of the TRACE charts developed for each of the projects and all applicable supporting documentation and analysis as identified in Task 5. The report shall be provided in a to-be-specified format to facilitate incorporation into and/or compatibility with the Survey Committee's report and findings. The TRACE analyses will not be released to the public.

The description of these tasks may be modified, based on the responses to this RFI or on the needs of the Committee before a contractor is selected.

The estimated number of TRACES will be between 12 and 15.

4.0 RESPONSE

We request that responders provide a description of previous experience in independent cost estimating and mission concept studies. The respondent should describe:

1) Expertise and experience with technical, risk, cost, and programmatic evaluation of mission concepts.
2) Approach to budget and schedule estimation, including relevant databases and analogy information. Include a description of the commonalities and differences in approach for mission concepts.
3) Qualification of staff who will be performing analyses and interfacing with the Committee and the members of its supporting panels.
4) Methodology for budget estimation and independent cost validation.
5) Approach to dealing with potential conflicts of interest and assurances that all materials provided from the contractor to the Academies will be unclassified; and processes for handling proprietary, confidential, ITAR-sensitive, or non-

public information.

The response should be no more than 20 pages.

DRAFT SCHEDULE (SUBJECT TO CHANGE)	
August 2022 [COMPLETED]	• Steering group meetings commence
August 2022 [COMPLETED]	• Science white papers due
September – October 2022	• RFI Posted on Decadal Survey webpage • Accepting submissions for TRACE RFI
November - December 2022	• RFQ sent to potential contractors • Responses to RFQ due to NASEM
December 2022 – January 2023	• TRACE contractor selected
January – February 2023	• TRACE contractor begins meetings with Committee and supporting panels
February – June 2023	• Selected contractor will work with Survey to TRACE selected mission concepts
February 2024	• Draft survey report sent to external reviewers • Contractor expected to be available for further consultation until draft report is complete