Vigil Focused Mission of Opportunity (FMO)
Announcement of Opportunity (AO)
Pre-Proposal Conference (PPC)
Technical, Management, and Cost (TMC)
Evaluation Overview

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Outline

Notable Sections and Requirements

Technical, Management, and Cost Evaluation

References

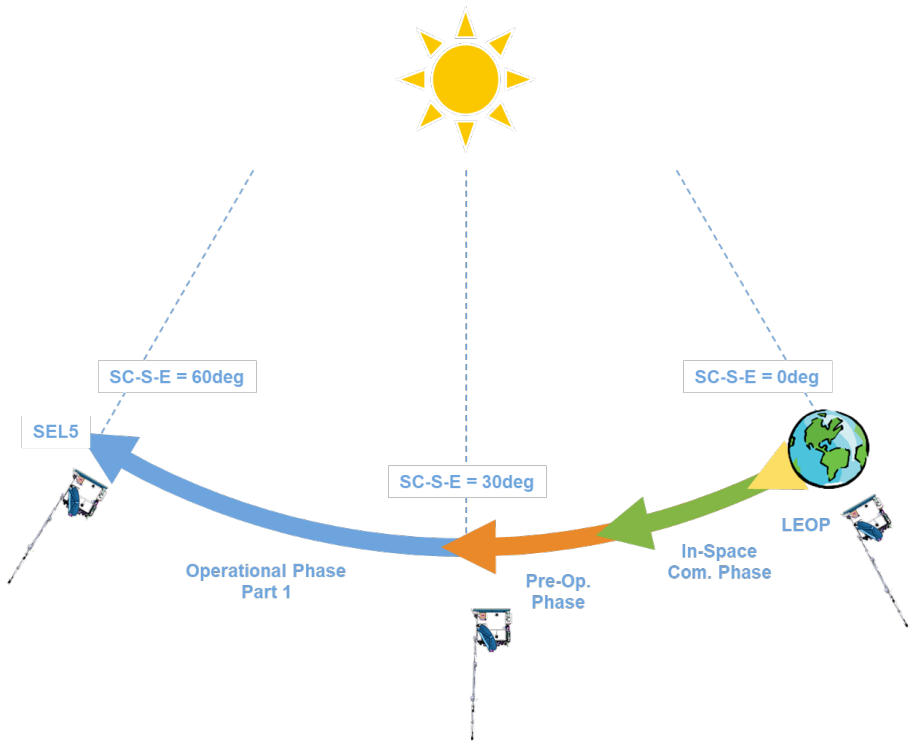
Questions

Notable AO Questions and Answers, Sections, and Requirements

Notable AO Q&As (1 of 2)

Q6: The DRAFT AO does not specify the length of Phase E. Is it 7.5 years as shown in the ESA document VGL-IRD-ESA-NIO-0037 Issue 1.0 *VIGIL MISSION NASA INSTRUMENT OF OPPORTUNITY (NIO) INTERFACE REQUIREMENTS DOCUMENT*, page 16?

A6: No. Proposers should assume a three (3) year Phase-E duration comprising one (1) year between 32.3 degrees separation from Earth with respect to the Sun and the 5th Sun-Earth Lagrangian point (SEL5), followed by two (2) years at SEL5. Checkout should be assumed to be for one (1) month, between 30 and 32.3 degrees separation from Earth with respect to the Sun.



[IRD] *Figure 2: Outline of the mission timeline.*

Notable AO Q&As (2 of 2)

Q5: Given that this FMO is for an instrument, Requirement 30 in the DRAFT AO's Section *5.2.6 Project Protection Plan* does not seem applicable, as the FMO Team will not have any control over spacecraft commanding.

A5: NASA-STD-1006A provides suggested tailoring regarding instrument command stack protection and interference reporting guidance for hosted instruments that must be considered in addressing DRAFT AO Requirement 30. Other aspects of NASA-STD-1006A, such as the necessity of protecting the confidentiality of Command Link Critical Program/Project Information (CPI) as controlled unclassified information (CUI), must also be addressed.

> **[NASA-STD-1006A]** ***4.1.1.b [Requirement SSPR 1] may be tailored to accommodate the nature of the mission. The following tailoring is suggested [and will be accepted by TMC] for use by applicable missions:***
>
> ***i. Hosted instruments only require protection of the instrument command stack.***
>
> ***ii. Hosted instruments are only responsible for protection of the command stack until the host spacecraft operations center receives commands. This protection may be provided either via encryption (preferred) or authentication.***

Notable AO Sections and Requirements

4.6.2 *Earned Value Management Plan*

For Government entities, the earned value management (EVM) requirements are listed in NPR 7120.5F. For entities receiving contracts, the EVM requirements are listed in NFS 1852.234-2 and NFS 1834.201, amended by Procurement Class Deviation PCD 15-05. The requirements apply to all cost or fixed-price incentive contracts for development or production work, with specific levels of validated compliance with the ANSI/EIA-748 guidelines required for contracts above $20M (RY) and for those above $100M (RY). **For Class D payloads with an estimated Real Year life-cycle cost below $150M, cost or fixed-price incentive contracts and subcontracts with a value of at least $20M are granted a deviation from the FAR and NFS 1834.201, Earned Value Management Systems requirement. [Emphasis added.]**

Notable AO Sections and Requirements (continued)

5.6.6 Contributions

Requirement 63. **If a proposal includes U.S. or non-U.S. contributions that are essential to the success of the proposed investigation or on the critical path, the proposal shall include:** (i) demonstrations of clear and simple technical and management interfaces in the proposed cooperative arrangements, (ii) explicit evidence that the proposed contributions are within the contributors' scientific and technical capabilities, (iii) demonstration that formulation can be accommodated in the absence of international agreements and **(iv) mitigation plans for the failure of funding or contribution to materialize, to include holding fully encumbered reserves to develop the contribution directly. [Emphasis added.]**

Notable AO Sections and Requirements (continued)

5.2.9 Engineering Model

An engineering model (EM) representing the mechanical and electrical functionality of each proposed instrument **must be delivered to the spacecraft manufacturer no later than Q3 2026. [Emphasis added.]** Related GSE must be delivered with the EM. A mechanical fit check and electrical functional testing will be conducted on the spacecraft engineering model, including electromagnetic compatibility (EMC) emissions and susceptibility tests, as well as electrostatic discharge (ESD) tests. No additional environmental tests beyond EMC and ESD will be performed using the EM.

Notable AO Sections and Requirements (continued)

5.2.10 Structural-Thermal Model

A structural-thermal model (S-TM) of each proposed instrument must be delivered to the spacecraft manufacturer no later than Q4 2027, fully representative of the end product for [AO-specified] aspects **[Emphasis added.]**

Notable AO Sections and Requirements (continued)

7.1.1 Evaluation Process

Proposers should be aware that, during the evaluation and selection process, NASA may request clarification of specific points in a proposal; if so, such a request from NASA and the proposer's response must be in writing. […] Proposers will be allowed up to eight combined pages in total (with some restrictions) for clarifications associated with the Scientific and VC Operational Merit of the Proposed Investigation (A Factors) plus Scientific and VC Operational Implementation Merit and Feasibility of the Proposed Investigation (B Factors) evaluation criteria. Up to six pages in total (with some restrictions) will be allowed for clarifications associated with the TMC Feasibility of the Proposed Investigation Implementation (C Factors) evaluation criterion. These **clarifications may include text, tables, and figures to address the Potential Major Weaknesses (PMWs) and to provide additional information. [Emphasis added.]** The requirements and constraints of the clarification process will be addressed in the Pre-proposal Web Conference (see Section 6.1.1 of this AO) and the Evaluation Plan that will be located on the Acquisition Homepage (see Section 6.1.4).

PIs whose proposals have no PMWs will be informed that no PMWs have been identified.
All PIs are allowed the same number of pages for Clarifications, including those who have no PMWs.
The full set of clarification responses to the factors above will be considered by the Science and VC Operations panel, and the TMC panel. Only the responses will be provided to the other panel.
Proposers will have at least 48 hours to respond.

TMC Evaluation

TMC Evaluation

Evaluation Criteria

Evaluation Criteria:

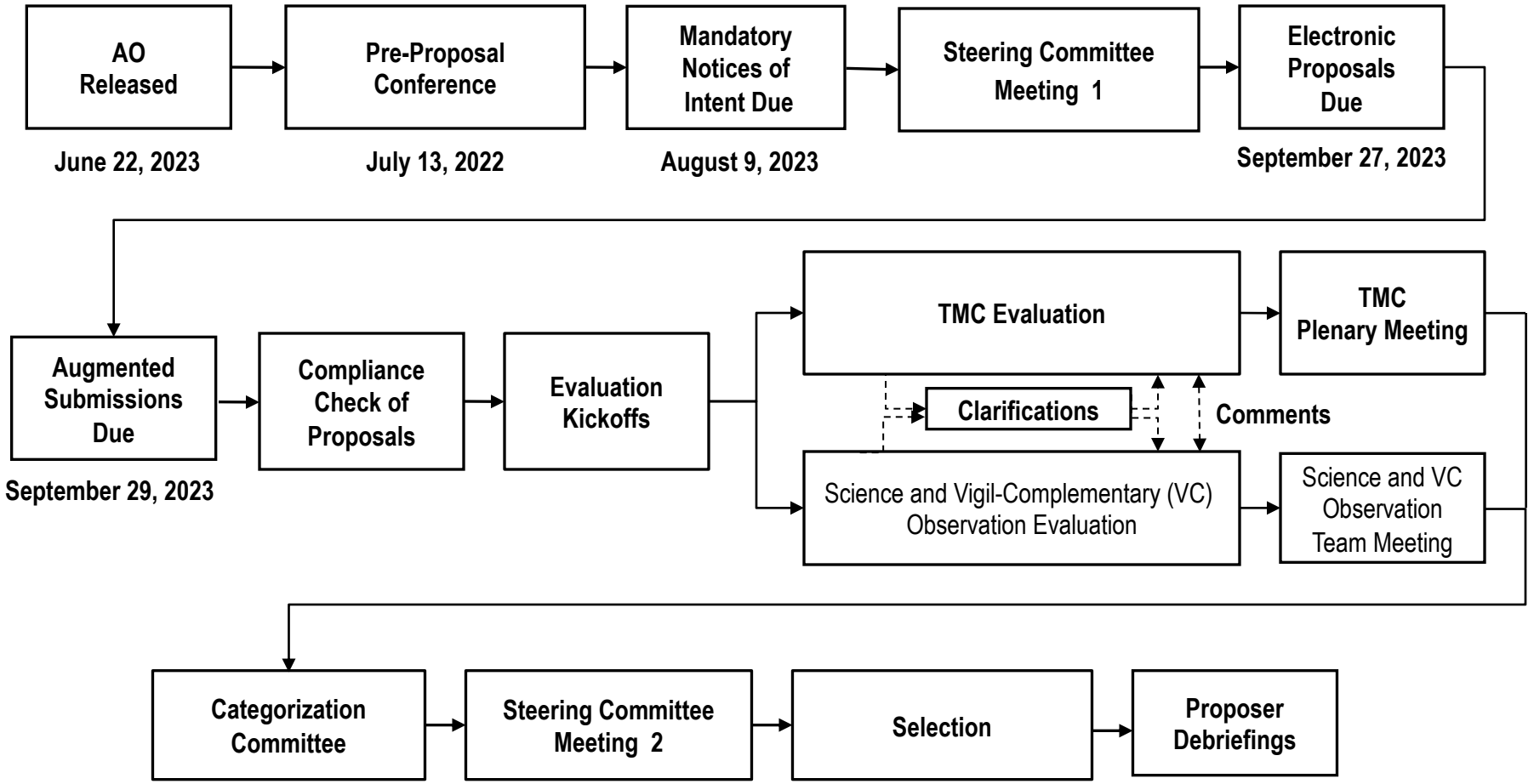
- Scientific VC operational merit of the proposed investigation
- Scientific and VC operational implementation merit and feasibility of the proposed investigation
- **Technical, management, and cost (TMC) feasibility of the proposed mission implementation**

Weighting: the first criterion is weighted approximately 40%; the second and **third criteria** are **weighted approximately 30%** each. Citizen Science and SEOs will be evaluated as separate factors and considered during the selection process.

TMC Evaluation: The purpose of the TMC evaluation is to assess the likelihood that the submitted investigations' technical and management approaches can be successfully implemented *as proposed*, including an assessment of the likelihood of their completion within the proposed cost and schedule.

TMC Evaluation

AO Flow



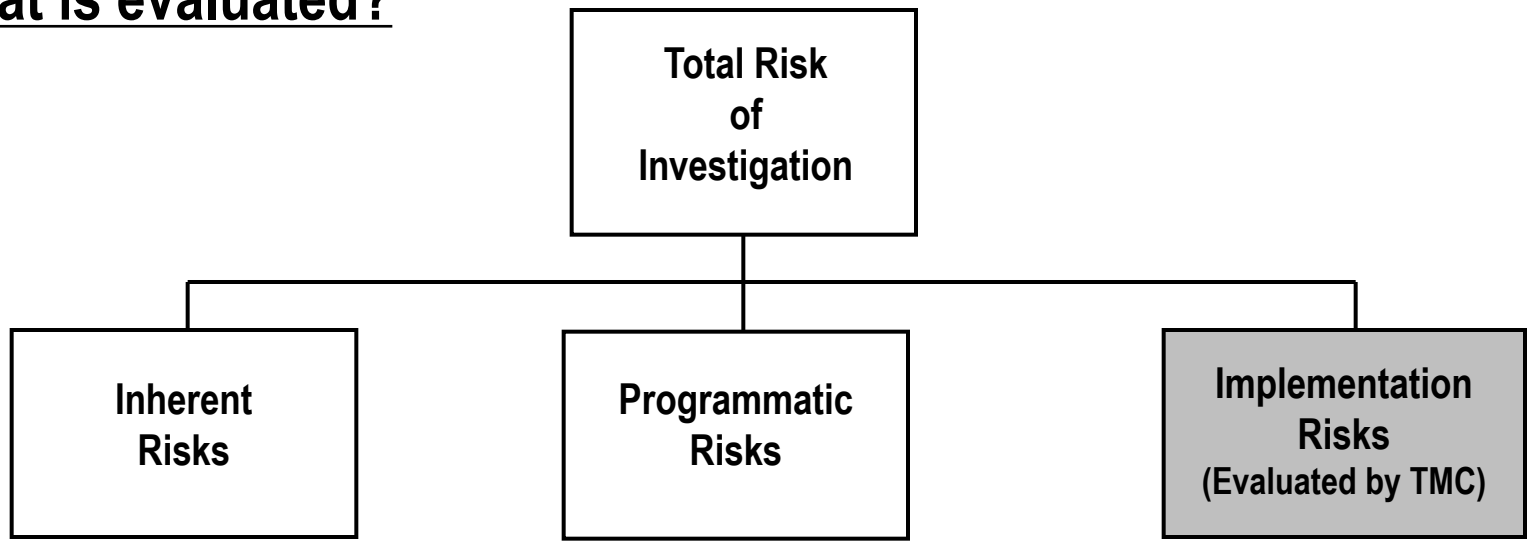
TMC Evaluation

TMC Proposal Evaluation Factors:

- Factor C-1. Adequacy and robustness of the instrument implementation plan.
- Factor C-2. Adequacy and robustness of the mission design and plan for mission operations.
- Factor C-3. Adequacy and robustness of the flight systems. **[Not a consideration for this opportunity.]**
- Factor C-4. Adequacy and robustness of the management approach and schedule, including the capability of the management team.
- Factor C-5. Adequacy and robustness of the cost plan, including cost feasibility and cost risk.

TMC Evaluation

What is evaluated?



Risks that are unavoidable to do the investigation:
- Launch environments
- Space environments
- Mission durations
- Technologies or technology extensions
- Unknowns
- Etc.

Risks that are uncertainties due to matters beyond project control:
- Environmental Assessment approvals
- Budgetary uncertainties
- Political impacts
- Late/non-delivery of NASA provided project elements
- Stability and reliability of proposed partners and their contributions
- Etc.

Risks that are associated with implementing the investigation:
- Adequacy of planning
- Adequacy of management
- Adequacy of development approach
- Adequacy of schedule
- Adequacy of funding
- Adequacy of Risk Management (planning for the known and unknown)

TMC Evaluation

Evaluation Principles

- Basic Principles:
  - It is assumed that the proposer is the expert on his/her proposal.
  - Proposer's task is to *demonstrate* that the investigation implementation is Low Risk.
  - TMC panel's task is to try to *validate* proposer's assertion of Low Risk.
- Risk is to be assessed on the basis of material provided in the proposal and through the clarification process. All Proposals are evaluated to identical standards and not compared to other proposals.
- TMC Panels consist of evaluators who are experts in the areas that they evaluate.
- Specialist Evaluators (to provide special technical expertise to the TMC Panel) may be used based on need for expertise in a specific technology that is proposed.
- The Cost Analysis is integrated into the overall Risk Rating.
- Proposal Risk Assessment: Proposals are based on Pre-Phase-A concepts; TMC Risk Assessments give appropriate benefit of the doubt to the proposer.

TMC Evaluation

TMC Evaluation Findings

Major and minor strengths and weaknesses are defined as follows:

- **Major Strength:** A facet of the implementation response that is judged to be well above expectations and can substantially contribute to the ability of the project to meet its technical requirements on schedule and within cost.
- **Minor Strength:** A strength that is worthy of note and can be brought to the attention of proposers during debriefings, *but is not a discriminator in the assessment of risk.*
- **Major Weakness:** A deficiency or set of deficiencies taken together that are judged to substantially weaken the project's ability to meet its technical objectives on schedule and within cost.
- **Minor Weakness:** A weakness that is sufficiently worrisome to note and can be brought to the attention of proposers during debriefings, *but is not a discriminator in the assessment of risk.*

Note: Items that are considered "as expected" will not be documented as findings.

TMC Evaluation

Cost Analysis

- Initial cost analyses are accomplished on the basis of information provided in the proposals (consistency, completeness, proposed basis of estimate, contributions, use full cost accounting, maintenance of reserve levels, cost management, etc.).
- One or more cost models are utilized to validate the proposed costs, both developmental and operational.
- Implementation threats are identified for all Major Weaknesses.
- Cost threat impacts to the proposed unencumbered reserves are assessed (see Cost Threat Matrix on next slide). The remaining unencumbered reserves are compared to the minimums required in the AO, for costs to complete.
- The entire panel participates in Cost deliberations.
- Cost validation findings are documented in the Cost Factor on Form C and considered in the TMC Risk Rating.

TMC Evaluation

Cost Threat Matrix

- The *likelihood* and *cost impact*, if any, of each weakness is stated as "This finding represents a cost threat assessed to have a Unlikely/Possible/Likely/Very Likely/Almost Certain likelihood of a Minimal/Limited/Moderate/Significant/Very Significant cost impact being realized during development and/or operations."
- The *likelihood* is the probability range that the *cost impact* will materialize.
- The *cost impact* is the current best estimate of the range of costs to mitigate the realized threat.
- The cost threat matrix below defines the adjectives used to describe the *likelihood* and *cost impact*.
- The *minimum* cost threat threshold is $400K for Phases B/C/D and $250K for Phase E.
- Unquantified cost threats may also be assessed.

			Cost Impact (CI) % of PI-Managed Mission Cost to complete Phases B/C/D or % of Phase E not including unencumbered cost reserves or contributions				
	Likelihood of Occurrence	**Weakness**	**Minimal** $0.4M < CI ≤ 5% $0.25M < CI ≤ 5%	**Limited** 5% < CI ≤ 10% 5% < CI ≤ 10%	**Moderate** 10% < CI ≤ 15% 10% < CI ≤ 15%	**Significant** 15% < CI ≤ 20% 15% < CI ≤ 20%	**Very Significant** CI > 20% CI > 20%
Likelihood (L, %)	Almost Certain (L > 80%)						
	Very Likely (60% < L ≤ 80%)						
	Likely (40% < L ≤ 60%)						
	Possible (20% < L ≤ 40%)						
	Unlikely (L ≤ 20%)						

TMC Evaluation

TMC Evaluation Risk Ratings Definitions

Based on the narrative findings, each proposal will be assigned one of three Risk Ratings:

- **Low Risk:** There are no problems evident in the proposal that cannot be normally solved within the time and cost proposed. Problems are not of sufficient magnitude to doubt the proposer's capability to accomplish the investigation well within the available resources.
- **Medium Risk:** Problems have been identified, but are considered within the proposal team's capabilities to correct within available resources with good management and application of effective engineering resources. Investigation design may be complex and resources tight.
- **High Risk:** One or more problems are of sufficient magnitude and complexity as to be deemed unsolvable within the available resources.

TMC Evaluation

TMC Evaluation Risk Ratings: Envelope Concept

Envelope: All TMC resources available to handle known and unknown development problems that occur. Includes schedule and funding reserves; reserves and margins on resources such as mass, power, and data; fallback plans; and personnel.

Low Risk: Required resources fit well within available resources

Medium Risk: Required resources fit within available resources.

High Risk: Required resources DO NOT fit within available resources.

References

Program Library

It is incumbent upon the proposer to ensure that the documents used in proposal preparation are of the date and/or revision available in the Program Library (https://lws.larc.nasa.gov/vfmo/programlibrary.html).

A detailed Change Log has been implemented and will continually document updates to the Program Library.

Questions

Questions

Any subsequent questions pertaining to the TMC Evaluation of Vigil FMO AO proposals *must* be addressed to:

Dr. James Spann
Space Weather Program Scientist
Heliophysics Division
Science Mission Directorate
National Aeronautics and Space Administration
Washington, DC 20546-0001
Email: jim.spann@nasa.gov (subject line to read “Vigil FMO AO Questions”)

Questions may be submitted until September 13, 2023 (14 days before the proposal due date). Answers will be provided no later than September 17, 2023 (10 days before the proposal due date).