Earth Venture Instrument - 3 SALMON-2 AO Program Element Appendix Technical, Management and Cost Evaluation Overview: Preproposal Teleconference/WebEx

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April 14, 2015

Outline

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Introduction

Purpose of this Presentation

1. Present a short overview of the Technical, Management and Cost (TMC) Evaluation of proposals submitted as a result of the Earth Venture Instrument-3 (EVI-3) Program Element Appendix (PEA) of the Second Stand Alone Missions of Opportunity Notice (SALMON-2) Announcement of Opportunity (AO).
2. Present some EVI-3 PEA Highlights
3. Point to reference documents
4. Answer questions

Important Note: This PEA is to the SALMON-2 AO which is based on SMD's Standard PI-Led Mission AO. All proposers must read this PEA & the SALMON-2 AO carefully, and all proposals must comply with the requirements and constraints contained within the two documents.

EVI-3 PEA Highlights

EVI-3 PEA: Highlights

4.5.2 Instrument Investigation Science Instrument System and Platform Interfaces

Requirement P-19. Proposals for instrument investigations that will be accommodated on a NASA selected platform shall clearly state the proposed instrument mass, volume dimensions, power requirements, platform stabilization requirements, thermal requirements, observational geometry requirements, launch vibration constraints, electromagnetic interference/ electromagnetic compatibility (EMI/EMC) requirements, data rate requirements, and all other requirements (or constraints, preferences, etc.) **that the instrument places on the platform for accommodation**, launch, deployment, operations, etc. A template is provided on the EVI-3 Library to aid proposers to provide this data. **This table shall be provided in the experiment implementation section (Section E) of the proposal. This table does not count towards the proposal page limit**.

Please recall that there are Common Instrument Interface (CII) guidelines which are available through links in the EVI-3 Library, the International Space Station (ISS) can be proposed as a potential platform, and **proposals may include information on any research the proposing team has done relative to potential payload accommodations for their proposed instrument** (yet this is not a requirement for any proposal).

EVI-3 PEA: Highlights

5.10.3 Classified Proposal Appendix regarding Heritage (SALMON-2 AO)

The use of a classified appendix regarding heritage is being permitted. NASA will endeavor to use the information in the classified appendix regarding heritage to better understand the proposed investigation. However, NASA cannot guarantee that this process will be fully successful in informing the review panel of the impact of a classified appendix regarding heritage which they have not read.

Requirement 88. Proposers that choose to submit a classified appendix regarding heritage shall submit the appendix and a cover letter to NASA Headquarters no later than the proposal due date. The proposer shall determine the appropriate security classification for the classified appendix, the proposer shall obtain any permission required for a reviewer to read the classified appendix, and the proposer shall ensure that all appropriate security requirements are followed in delivering the classified appendix to NASA Headquarters.

EVI-3 PEA: Highlights

5.2 Proposal Submission Requirements

The proposal evaluation process requires evaluators free of Conflict of Interest. In order to assist NASA in the planning of the proposal evaluation process, NASA requires a comprehensive list of proposed investigation participants.

Requirement P-36. With the proposal submission via NSPIRES, the proposers shall identify any institution that is specified in the proposal but that does not appear in either the "Team Member" section (Section VI) of the cover page or in answer to the question about "participants […] who do not appear on the proposal's cover page". The proposer shall list the institution and division name, role (e.g., solar array provider, instrument component provider), and estimated fixed year dollars to be received. This information will be used to avoid financial and organizational conflicts of interest during the evaluation process by checking evaluators against institutions that are proposed to supply materials, parts, or services.

EVI-3 PEA: Highlights

4.5.1 New Technologies/Advanced Engineering Developments

This section intends to clarify the requirement for New Technologies and/or Advanced Engineering Developments and supersedes Section 5.3.4 of the SALMON-2 AO.

This EVI-3 PEA solicits flight missions, not technology or advanced engineering development projects. Proposed investigations are generally expected to have mature technologies, with systems at a Technology Readiness Level (TRL) of 6 or higher. **For the purpose of TRL assessment, systems are defined as level 3 Work Breakdown Structure (WBS) payload developments (i.e., individual instruments) and level 3 WBS spacecraft elements (e.g., electrical power system); see Figure 3-7 of the *NASA WBS Handbook*, NASA/SP-2010-3404**, which can be found in the EVI-3 Library. TRLs are defined in NPR 7123.1B *NASA Systems Engineering Processes and Requirements*, Appendix E, which can be found in the EVI-3 Library.

Proposals with a limited number of less mature technologies and/or advanced engineering developments are permitted as long as they contain a plan for maturing systems to TRL 6 (see NASA/SP-2007-6105 Rev 1, *NASA Systems Engineering Handbook*) by no later than at Preliminary Design Review (PDR) and adequate backup plans that will provide mitigation in the event that the systems cannot be matured as planned. The TRL state of systems may be validated by an independent team at PDR.

Requirement P-18. Proposals that use systems currently at less than TRL 6 shall include a plan for system maturation to TRL 6 by no later than PDR and a backup plan in the event that the proposed systems cannot be matured as planned (**see Section 5.1 of this PEA, for additional detail**).

EVI-3 PEA: Highlights

4.5.3 CubeSat Investigations

CubeSat proposals are recommended to comply with Cal Poly CubeSat Developer's specifications, found at http://cubesat.calpoly.edu/index.php/documents/developers. Concepts that do not comply with the Cal Poly CubeSat and Poly Picosat Orbital Deployer (P-POD) standards should clearly describe how their designs are packaged and deployed. NASA Launch Services Program has issued a *Program Level Dispenser and CubeSat Requirements Document* with requirements for CubeSats sized up to 6U (2U x 3U). All proposals for CubeSats sized up to 6U shall be compliant with these requirements. Both of these documents can also be found in the EVI-3 Library. No CubeSat form factors larger than 6U will be considered under the present call. Qualifying CubeSat form factors (size) include 1U, 1.5U, 2U, 3U and 6U with a mass not to exceed 1.33 kg per U.

Requirement P-20. All CubeSat proposals shall be compliant with the requirements in the NASA Launch Services Program *Program Level Dispenser and CubeSat Requirements Document*. No CubeSat form factors larger than 6U will be considered under the present call. Qualifying CubeSat form factors (size) include 1U, 1.5U, 2U, 3U and 6U with a mass not to exceed 1.33 kg per U.

TMC Evaluation

TMC Evaluation

Evaluation Criteria

Evaluation Criteria:

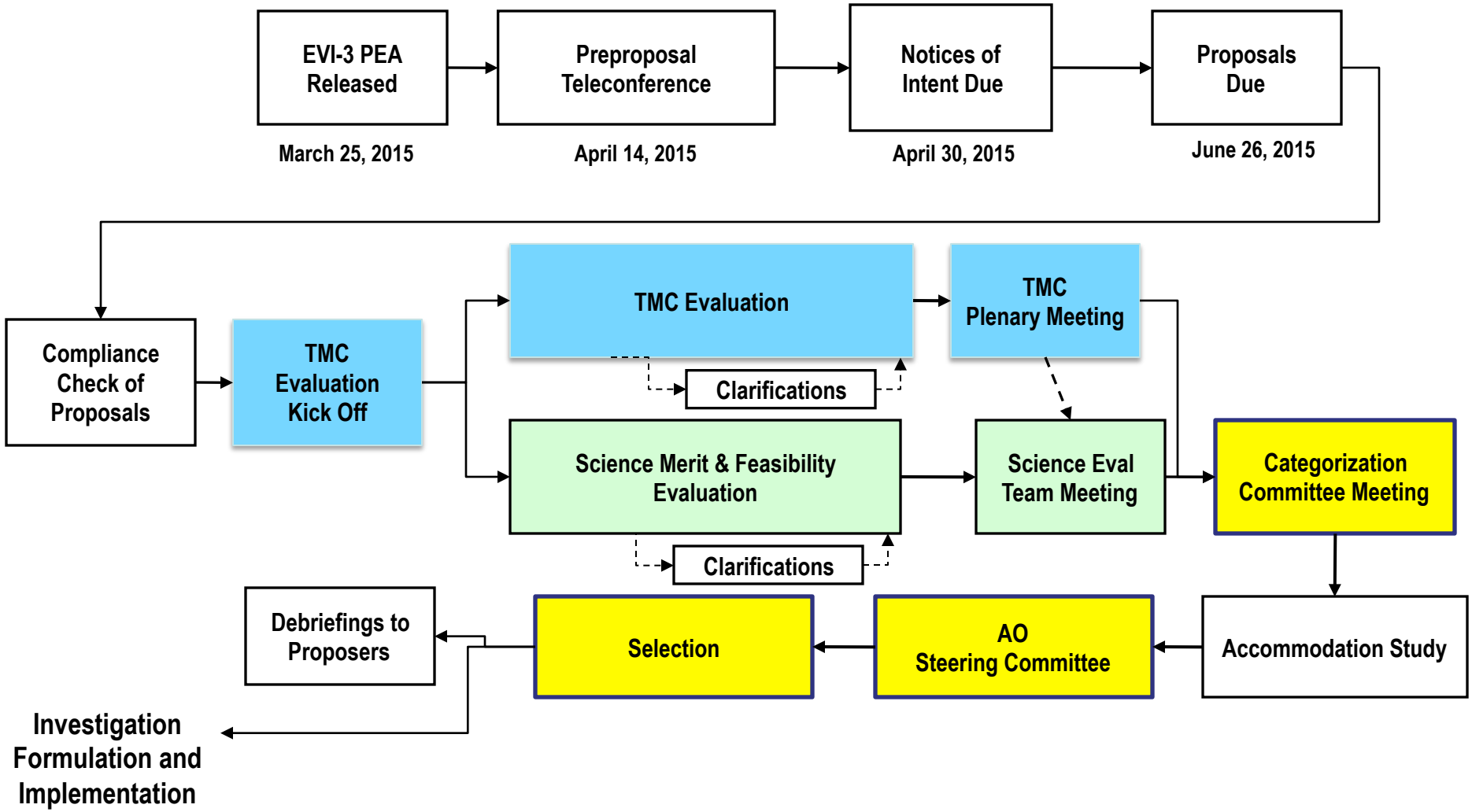
- Intrinsic Science Merit of the Proposed Investigation
- Experiment Science Implementation Merit and Feasibility of the Investigation
- **TMC Feasibility of the Investigation Implementation, including Cost Risk**

Weighting: the first criterion is weighted approximately 40%; the second and **third criteria are weighted approximately 30%** each.

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

TMC Evaluation

Proposal Evaluation Flow



TMC Evaluation

What is evaluated?

Total Risk of Science Flight Mission

Inherent Risks

Risks that are unavoidable to do the investigation:

- Launch environments
- Space environments
- Mission durations
- Unknowns
- Etc.

Programmatic Risks

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
- Etc.

Implementation Risks (Evaluated by TMC Panel)

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 known & unknown)

TMC Evaluation

TMC Evaluation Purpose and Principles

TMC evaluation purpose: 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.

- 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 risk is low.
  - TMC panel's task is to try to validate proposer's assertion of low risk.

- Merit is to be assessed on the basis of material in the proposal. All Proposals are evaluated to identical standards and not compared to other proposals.
- TMC Panels consist of evaluators who are experts in the factors that they evaluate.
- TMC Panels develop findings for each proposal - Findings: "As expected" (no finding), "above expectations" (strengths), "below expectations" (weaknesses). Risk Ratings should reflect the written strengths and weaknesses.
- The Cost Analysis is integrated into 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 Factors:

TMC Feasibility of the Investigation Implementation, including Cost Risk:

- Factor C-1. Adequacy and robustness of the instrument implementation plan.
- Factor C-2. Adequacy and robustness of the investigation design and plan for operations.
- Factor C-3. Adequacy and robustness of the flight systems.*
- 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.

***Factor C-3 not applicable to EVI-3 Instrument Investigations.**

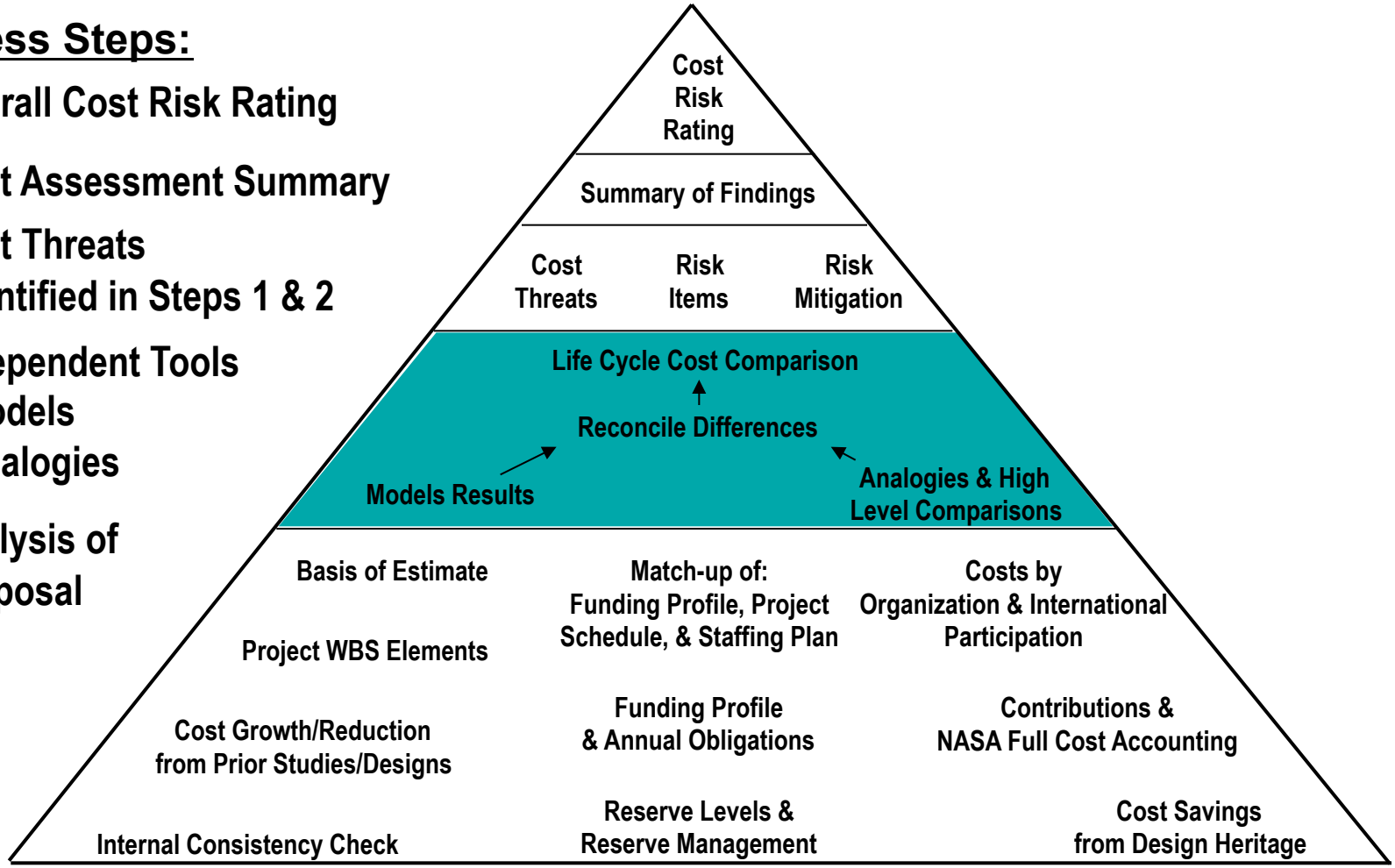
EVI-3 PEA P does not modify Factor C of the SALMON-2 AO.

TMC Evaluation

TMC Cost Analysis: The Pyramid

Process Steps:

5. Overall Cost Risk Rating
4. Cost Assessment Summary
3. Cost Threats identified in Steps 1 & 2
2. Independent Tools
   - Models
   - Analogies
1. Analysis of Proposal



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: Findings that are considered "as expected" are not documented.

TMC Evaluation

TMC Evaluation Clarifications

NASA will request clarification from proposers on potential major weaknesses and significant cost findings identified during the TMC Feasibility of the Investigation Implementation, including Cost Risk evaluation.

- NASA will request such clarification uniformly, from all proposers. PIs whose proposals have no potential major weaknesses or significant cost findings will receive an email informing them.
- All requests for clarification from NASA, and the proposer's response, will be in writing.
- The ability of proposers to provide clarification to NASA is extremely limited, as NASA does not intend to enter into discussions with proposers. The form of the clarifications is strictly limited to a few types of responses:
  - Identification of the locations in the proposal (page(s), section(s), line(s)) where the potential major weakness is addressed
  - Noting that the potential major weakness is not addressed in the proposal.
  - Stating that the potential major weakness is invalidated by information that is common knowledge and is therefore not included in the proposal.
  - Stating that the analysis leading to the potential major weakness is incorrect and identifying a place in the proposal where data supporting a correct analysis may be found.
  - Stating that a typographical error appears in the proposal and that the correct data is available elsewhere inside or outside of the proposal.

The PI will be given at least 24 hours to respond to the request for clarification. Any response that goes beyond a clarification will be deleted and will not be shown to the evaluation panel.

TMC Evaluation

TMC Evaluation Risk Ratings Definitions

TMC Evaluation Purpose: 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.

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. Mission 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.

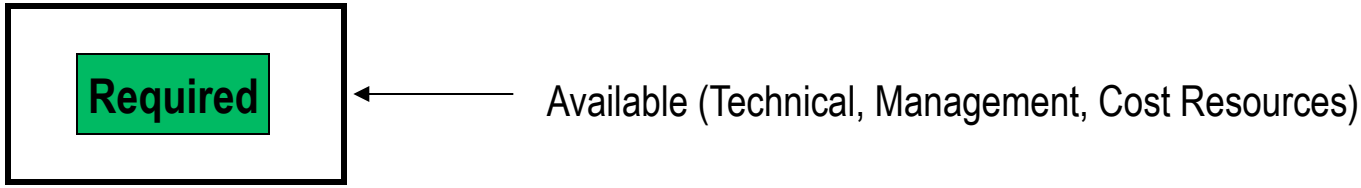
*Note: Only Major Findings are considered in the Risk Rating.

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 physical resources such as mass, power, and data; descope options; fallback plans; and personnel.

Low Risk: Required resources fit well within available resources



Medium Risk: Required resources just barely inside available resources.

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

Accommodation Study

Accommodation Comments and Study

The panel evaluating the third evaluation criterion; Technical, Management, and Cost (TMC) Feasibility of the Investigation Implementation, including Cost Risk, will also provide comments to NASA regarding the extent to which the proposed instrument is compatible with potential satellite platform interfaces and operations. These comments will not be considered for the TMC Feasibility of the Investigation Implementation, including Cost Risk evaluation.

After the evaluation, but prior to the selection decision, NASA will perform an accommodation study of selectable instrument investigation proposals to assess the extent to which the proposed instrument is compatible with potential satellite platform interfaces and operations. This accommodation study will also consider the accommodations of selectable CubeSat proposals for launch. *(EVI-3 PEA P Section 6.1)*

References

EVI-3 Acquisition Homepage

The EVI-3 Acquisition Homepage is found at http://essp.larc.nasa.gov/EVI-3/.

EVI-3 Library

All reference documents are available at http://essp.larc.nasa.gov/EVI-3/evi-3_library.html

***TRL Examples* document (New)**

Examples that provide possible scenarios where system level Technology Readiness Level (TRL) 6 is demonstrated. Proposing teams should address the requirement according to their investigation's unique system considerations, including stages of development.

***EVI Common Causes of Major Weaknesses* document**

Common causes of major weaknesses identified during the TMC evaluation of proposals submitted to EVI-1 solicitation. NASA is providing this service to assist the community to continually improve the quality of proposals.

***TMC on Class C and Class D Payloads* document**

Created to provide clarification to proposers on expectations TMC evaluators may have regarding Class D and C payloads. These expectations are in no way intended to be a comprehensive checklist on evaluating Class C and D (including CubeSat) proposals, and are intended to be supplementary and educational with the goal of assisting the proposers.

Questions

Questions

All questions pertaining to the EVI-3 PEA MUST be addressed to:

Thomas Wagner, PhD
Earth Venture Instrument-3 Program Scientist
Earth Science Division
Science Mission Directorate
NASA Headquarters
Washington, DC 20546

Preferably by email at:
thomas.wagner@nasa.gov
Subject line to read "EVI-3 PEA"