National Aeronautics and
Space Administration

2021 Astrophysics Explorers Mission of Opportunity

Evaluation Plan

~~Arpil 1, 2022~~ **Revised May 16, 2022**

Announcement of Opportunity

NNH17ZDA040O

2021 Astrophysics MO Evaluation Plan Outline

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2021 Astrophysics MO Evaluation Plan Introduction

This package includes the Third Stand Alone Mission of Opportunity Notice (SALMON-3) Announcement of Opportunity (AO) NASA Science Mission Directorate (SMD) Evaluation Plan and the 2019 Astrophysics Explorers Program Element Appendix (PEA) Q Evaluation Plan.

The SALMON-3 AO is an omnibus solicitation for Principal Investigator (PI)-led Missions of Opportunity (MOs) that is updated by PEAs. The SALMON-3 AO NASA SMD Evaluation Plan covers the evaluation information from the SALMON-3 AO and from the NASA SMD evaluation processes conducted by the Science Evaluation Panel and Technical Management and Cost (TMC) Evaluation Panel. The “SALMON-3 AO Evaluation Plan” designation in the top right-hand corner of a slide indicates that the information refers to the SALMON-3 AO NASA SMD Evaluation Plan.

The 2021 Astrophysics Explorers PEA Q Evaluation Plan covers any updates to the evaluation information from SALMON-3 AO and from the NASA SMD evaluation processes that will be conducted by the Science Evaluation Panel and TMC Evaluation Panel. The “Astrophysics Explorers PEA Q Evaluation Plan” designation in the top right hand corner of a slide indicates that the information refers to the 2019 Astrophysics Explorers PEA Q updates.

Third Stand Alone Missions of Opportunity Notice Announcement of Opportunity NNH17ZDA040O

NASA Science Mission Directorate Evaluation Plan

SALMON-3 Evaluation Plan Outline

SALMON-3 Evaluation Plan Introduction

SALMON-3 AO Compliance Checklist: Appendix F

SALMON-3 AO NASA SMD Evaluations: General

Science Evaluation

TMC Evaluation

Categorization

Selection

Approval

SALMON-3 Evaluation Plan Introduction

The Third Stand Alone Missions of Opportunity Notice (SALMON-3) Announcement of Opportunity (AO) NASA Science Mission Directorate (SMD) Evaluation Plan covers the evaluation information from the SALMON-3 AO, which is the omnibus solicitation that is updated by each Program Element Appendix (PEA), and from the NASA SMD evaluation processes conducted by the Science Evaluation Panel and Technical, Management, and Cost (TMC) Evaluation Panel.

The Evaluation Plan for a specific PEA is found in the PEA-specific Acquisition Homepage.

SALMON-3 Compliance Checklist: Appendix F

Compliance Checklist (1)

Checklist with the list of items that NASA checks for compliance before releasing a proposal for evaluation. All other requirements are checked during evaluation.

Administrative:

1. Electronic proposal received on time
2. Proposal on CD_ROMs received on time
3. Original signatures of PI and of authorizing official included
4. Meets page limits
5. Meets general requirements for format and completeness (maximum 55 lines text/page, maximum 15 characters/inch – approximately 12 pt. font, 1-inch margins)
6. Required appendices included; no additional appendices
7. Budgets are submitted in required formats
8. All individual team members who are named on the cover page indicate their commitment through NSPIRES
9. All export-controlled information has been identified
10. Complied with restrictions Involving China

Science, Exploration, or Technology:

11. Addresses solicited science, exploration, or technology programs
12. Requirements traceable from objectives to Mission

Compliance Checklist (2)

13. Plan to calibrate, analyze, publish, and archive the data returned
14. Baseline Investigation and Threshold Investigation defined

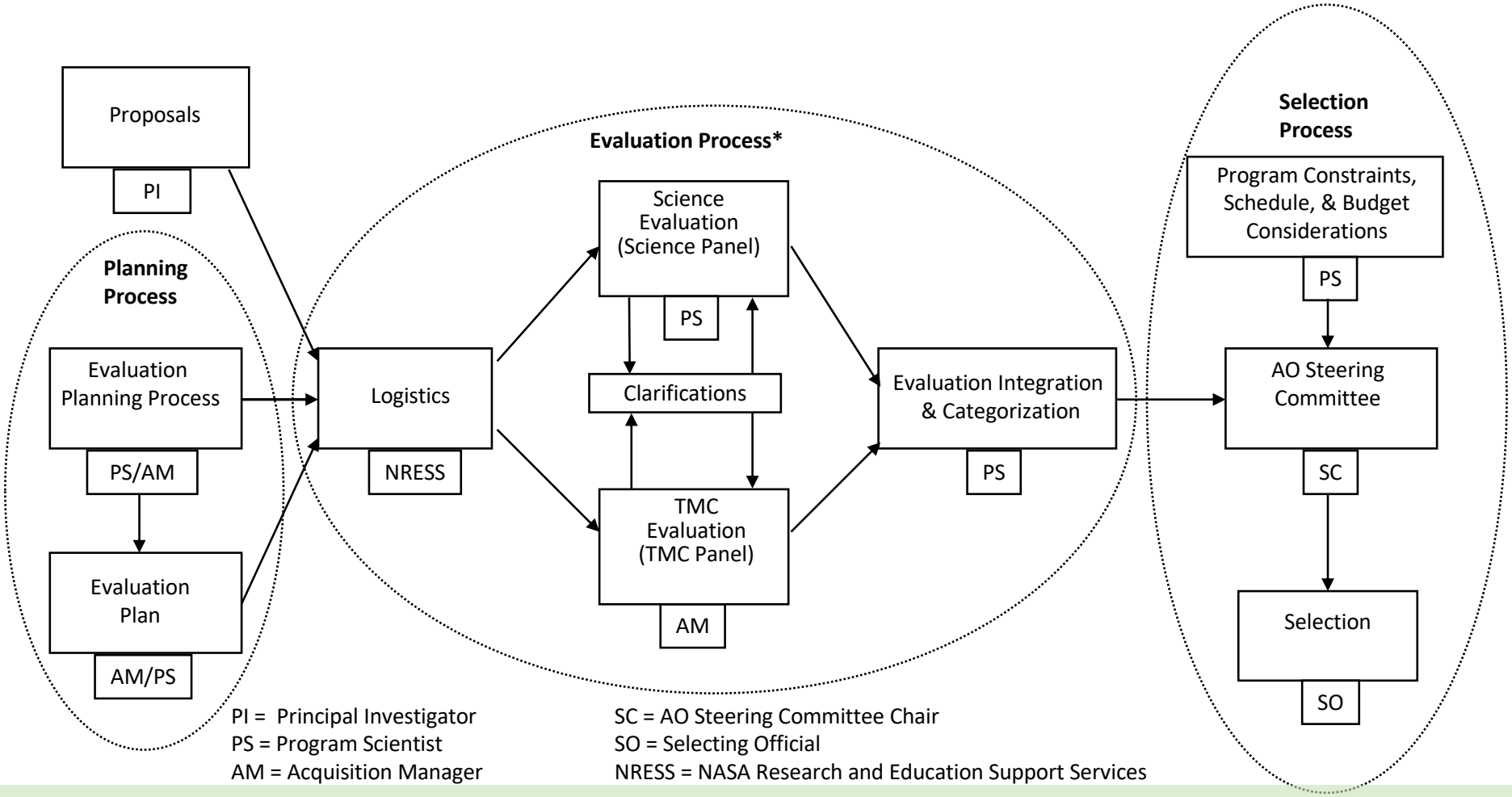
Technical:

15. Complete spaceflight mission (Phases A-F) proposed
16. Team led by a single PI (Principal Investigator)
17. PI-Managed Mission Cost within the PEA-specific Cost Cap (if a PEA-specific Cost Cap is stated in the applicable PEA)
18. Contributions within contribution limit (if PEA specifies a contribution limit)
19. Co-Investigator costs in budget
20. Launch/Commitment date prior to launch deadline (if PEA specifies a deadline)
21. Includes table describing non-U.S. participation
22. Includes letters of commitment from funding agencies for non-U.S participating institutions
23. Includes letters of commitment from all U.S. organizations offering contributions
24. Includes letters of commitment from all major partners and non-U.S. institutions providing contribution of efforts of anyone on the Proposal Team.

Note: SALMON-3 Section 5.9.1.2 states “Major partners are the organizations, other than the proposing organization, responsible for providing research leadership, project management, system engineering, major hardware elements, science instruments, integration and test, mission operations, and other major products or services as defined by the proposer.”

SALMON-3 AO NASA SMD Evaluations: General

NASA SMD Roles and Responsibilities



PI = Principal Investigator
PS = Program Scientist
AM = Acquisition Manager

SC = AO Steering Committee Chair
SO = Selecting Official
NRESS = NASA Research and Education Support Services

* The Evaluation Process is addressed in this document.

Pre-Evaluation – Steering Committee Meeting 1

- As part of the Evaluation Planning Process, before the evaluation process begins, an AO Steering Committee will be convened. This Committee is composed of the SMD Deputy Associate Administrator for Research (DAAR) and a small number of SMD Program Scientists/Executives.

- The AO Steering Committee will conduct an independent assessment of the planned evaluation and associated processes regarding their compliance to established policies and practices, completeness, and self-consistency. They may provide recommendations to the Program Scientist and Acquisition Manager on potential adjustments to the evaluation team and the planned processes.

Conflict of Interest Prevention Requirements

- The Science Panel members will be on-boarded through NASA Research and Education Support Services (NRESS), and the non-Civil Servants be provided an honorarium for their participation. The TMC Panel members will be on-boarded through the NASA Science Office for Mission Assessments (SOMA) support contractor, and the non-Civil Servants will be hired as contractors.
- NRESS cross-checks all the Science Panel members against the lists of personnel and organizations identified in each proposal submitted to determine whether any organizational Conflict of Interest (COI) exists.
- The SOMA support contractor cross-checks all TMC Panel members against the lists of personnel and organizations identified in each proposal submitted to determine whether any organizational COI exists.
- All evaluators must divulge any other financial, professional, or potential personal COI, and whether they work for a profit-making company that directly competes with any profit-making proposing organization.
- All Civil Service evaluators must self certify confirming that no COI exits.
- The TMC evaluators must notify the NASA SOMA Acquisition Manager, in case there is a potential COI. The Science evaluators must notify the Program Scientist, in case of a potential COI.

Conflict of Interest Prevention Requirements (Continued)

- All known potential conflict of interest issues are documented, and a COI Mitigation Plan is developed to minimize the likelihood that an issue will arise in the evaluation process. In the case of science evaluators recruited through the NRESS contract, standard mitigations have been defined (See SPD-01A) and will be applied. The results of the mitigations will be recorded in a log to be appended to the COI Mitigation Plan. For science evaluators not recruited through the NRESS contract, any potential COI issue is discussed with the Program Scientist and the NASA SMD Deputy Associate Administrator for Research and documented in the COI Mitigation Plan. All determinations regarding possible COIs that arise will be logged as an appendix to the COI Mitigation Plan.

- If any previously unknown potential COI arises during the evaluation, the conflicted member(s) will be notified to stop evaluating proposals immediately, and the Panel Chair will be notified immediately. If a COI is confirmed, the conflicted member(s) will be immediately removed from the evaluation process, and steps will be taken expeditiously, to remove, mitigate, or accept any actual or potential bias imposed by the conflicted member(s). The steps will be documented in the COI Mitigation Plan.

- Members of the Science and TMC panels are prohibited from contacting anyone outside their panel for scientific/technical input, or consultation, without the prior approval of the Program Scientist.

Proprietary Data Protection Requirements

- All proposal and evaluation materials are considered proprietary.
- Viewing of proposal materials are only on a need-to-know basis.
- Each evaluator signs a Non-Disclosure Agreement (NDA) that must be on file at NRESS prior to any proposals being distributed to that evaluator.
- The proposal materials that each evaluator has access to is recorded.
- Evaluators are not permitted to discuss proposals with anyone outside their Science or TMC Panel.
- All proprietary information that must be exchanged between evaluators will be exchanged *via* the secure NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES), *via* the secure Remote Evaluation System (RES), secure WebEx or *via* encrypted email, FedEx, fax, or regular mail. Weekly Web conferences among TMC Panel evaluators will be conducted *via* secure lines.
- Evaluators' electronic and paper evaluation materials will be deleted/destroyed when the evaluation process is complete. Archival copies will be maintained in the NASA SOMA vault.

Principles of Evaluation

- All proposals are to be treated fairly and equally.
- Merit is to be assessed on the basis of material in the proposal and clarification process (if applicable).
- Evaluation Ratings reflect the written strengths and weaknesses.
- Everyone involved in the evaluation process is expected to act in an unbiased objective manner; advocacy for particular proposals is not appropriate.

General Evaluation Ground Rules

- All proposals are evaluated to uniform standards established in the solicitation, and without comparison to other proposals.
- All evaluators are experts in the areas that they evaluate.
- Non-panel/mail-in evaluators (to provide special science expertise to the Science Panel) and specialist evaluators (to provide special technical expertise to the TMC Panel) may be utilized, respectively, based on need for expertise in a specific science or technology/engineering area that is proposed.

Evaluation Criteria and Selection Factors

Evaluation Criteria from Section 7.2 of the SALMON-3 AO:

1. Intrinsic Science, Exploration, or Technology Merit of the Proposed Investigation (Evaluated by the Science Panel);
2. Experiment Science, Exploration, or Technology Implementation Merit and Feasibility of the Proposed Investigation (Evaluated by the Science Panel);
3. TMC Feasibility of the Proposed Investigation Implementation (Evaluated by the TMC Panel).

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

Other Selection Factors from Section 7.3 of the SALMON-3 AO:

- Programmatic factors
- PI-Managed Mission Cost

Science Evaluation

Science Panel Composition and Organization

- The Program Scientist leads the Science Panel.
- Science evaluators are typically, but not exclusively, recruited from the academic, governmental, and industrial research communities.
- The Science Panel evaluates the Intrinsic Science Merit of the Proposed Investigation and the Experiment Science Implementation Merit and the Feasibility of the Proposed Investigation.
- The science evaluation is conducted *via* one Science Panel, however sub-panels may be employed, depending on the number and variety of proposed investigations.
  - Any sub-panel is led by a NASA Civil Servant and may be co-chaired by a member from the scientific community.
  - Sub-panels may have an Executive Secretary.
- Each proposal is evaluated by assigned panel members.
  - The Lead Evaluator for each proposal leads the discussion.
  - The Lead Evaluator may assign another Evaluator to take notes on the discussion.
- The TMC Panel may provide comments and questions to the Science Panel.

Science Panel Procedures

- Each Science Panel member evaluates proposals as directed by the Chair.
  - If special science expertise is required, the Science Panel may utilize non-panel/mail-in evaluators to assist with one or more proposals.
  - Non-panel/mail-in evaluators evaluates only those parts of proposals pertinent to their scientific specialties.
- Each proposal may be discussed by the evaluators in teleconferences.
  - Findings in the form of Strengths and Weaknesses form the basis for initial panel discussions.
  - Each panel member provides an individual evaluation prior to the teleconference.
  - During the teleconference, proposals and the individual evaluations including non-panel/mail-in evaluations are discussed.
  - Following the teleconference, the Lead Evaluator captures/synthesizes individual evaluations including discussions and generates the Draft Evaluation Forms including draft findings.

Science Panel Procedures

- A Science Panel Meeting is held to refine and finalize the science evaluation forms.
  - The Science Panel compiles all of the findings for each proposal.
  - For each proposal, the Chair or designated Lead Evaluator leads the discussion, summarizes the proposed investigation, and documents the results.
  - If warranted, the Panel may reconsider evaluations at the Meeting.
  - Evaluations of all proposals are reviewed during the Science Panel Meeting to ensure that standards have been applied uniformly and in an appropriate and fair manner.
  - The Lead Evaluator synthesizes and documents Panel evaluations.

Science Panel Evaluation Factors

Factors A-1 to A-6. Intrinsic Science, Exploration, or Technology Merit of the Proposed Investigation: Please refer to Section 7.2.2 of the SALMON-3 AO for details.

- Factor A-1. Compelling nature and priority of the proposed investigation's science, exploration, or technology goals and objectives.
- Factor A-2. Programmatic value of the proposed investigation.
- Factor A-3. Likelihood of science, exploration, or technology success.
- Factor A-4. Science, exploration, or technology value of the Threshold Investigation.
- Factor A-5. Merit of any Science-Exploration-Technology Enhancement Options (SEOs), if proposed.
- Factor A-6. Merit of any PI-developed Technology Demonstration Opportunities (TDOs), if proposed.

Science Panel Evaluation Factors

Factors B-1 to B7. Experiment Science, Exploration, or Technology Implementation Merit and Feasibility of the Proposed Investigation: Please refer to Section 7.2.3 of the SALMON-3 AO for details.

- Factor B-1. Merit of the instruments and investigation design for addressing the science, exploration, or technology goals and objectives.
- Factor B-2. Probability of technical success.
- Factor B-3. Merit of the data analysis, data availability, and data archiving plan and/or sample analysis plan.
- Factor B-4. Science, exploration, or technology resiliency.
- Factor B-5. Probability of investigation team success.
- Factor B-6. Merit of any Science-Exploration-Technology Enhancement Options (SEOs), if proposed.
- Factor B-7. Merit of PI-developed Technology Demonstration Opportunities (TDOs), if proposed.

Science Evaluation Findings

- **Major Strength:** A facet of the implementation response that is judged to be of superior merit and can substantially contribute to the ability of the project to meet its scientific objectives.

- **Major Weakness:** A deficiency or set of deficiencies taken together that are judged to substantially weaken the project's ability to meet its scientific objectives.

- **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 merit.

- **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 merit.

Note: Findings that are considered "as expected" are not documented in the Forms.

Factor A and B Rating Definitions

- **Excellent**: A comprehensive, thorough, and compelling proposal of exceptional merit that fully responds to the objectives of the AO as documented by numerous and/or significant strengths and having no major weaknesses.
- **Very Good**: A fully competent proposal of very high merit that fully responds to the objectives of the AO, whose strengths fully outbalance any weaknesses.
- **Good:** A competent proposal that represents a credible response to the AO, having neither significant strengths nor weakness and/or whose strengths and weaknesses essentially balance.
- **Fair**: A proposal that provides a nominal response to the AO, but whose weaknesses outweigh any perceived strengths.
- **Poor**: A seriously flawed proposal having one or more major weaknesses (e.g., an inadequate or flawed plan of research or lack of focus on the objectives of the AO).

Note: Only Major Findings are considered in the rating.

Science Panel Products: Form A

For each proposal, the Science evaluation will result in two forms, Forms A and B:

Form A

- Proposal title, PI name, and submitting organization;
- Proposal summary;
- The Intrinsic Science Merit of the Proposed Investigation adjectival ratings from each evaluator, ranging from “Excellent” to “Poor”;
- Summary rationale for the median rating;
- Narrative findings supporting the adjectival rating in the form of specific major or minor strengths or weaknesses;
- Comments to PI, Comments to NASA (optional)

Science Panel Products: Form B

For each proposal, the Science evaluation will result in two forms, Forms A and B:

Form B

- Proposal title, PI name, and submitting organization;
- The Experiment Science Implementation Merit and Feasibility of the Proposed Investigation adjectival ratings from each evaluator, ranging from “Excellent” to “Poor”;
- Summary rationale for the median rating;
- Narrative findings supporting the adjectival rating in the form of specific major or minor strengths or weaknesses;
- Comments to PI, Comments to NASA (optional)

TMC Evaluation

TMC Panel Composition and Organization

The Acquisition Manager, who is a Civil Servant from the NASA Science Office for Mission Assessments (SOMA) at NASA Langley Research Center (LaRC), leads the TMC panel. NASA SOMA works directly for NASA Headquarters and is firewalled from the rest of NASA LaRC.

TMC Panel evaluators are a mix of the best non-conflicted contractors, consultants, and Civil Servants who are experts in their respective fields.

- Evaluators read their assigned proposals.
- Evaluators provide findings on their assigned proposals.
- Evaluators provide ratings of proposals that reflect the findings.

Specialist evaluators may be called upon when technical expertise is needed that is not represented in the panel. They evaluate only those parts of a proposal that are specific to their particular expertise.

TMC Panel Evaluation Factors

Factors C1 – C5: TMC Feasibility of the Proposed Investigation Implementation: Please refer to Section 7.2.4 of the SALMON-3 AO for details. These factors are evaluated as applicable for each proposed investigation.

- 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.

TMC Cost Analysis: Step 1 of a Single Step Competitive Process

- Initial cost analyses is 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 cost.
- Implementation threats are identified.
- Cost threat impacts to the proposed unencumbered reserves are assessed (see Cost Threat Matrix slide 33). The remaining unencumbered reserves are compared to the minimum required in the PEA.
- The entire panel participates in Cost deliberations. All information from the entire evaluation process is considered in the final cost assessment.
- Cost Risk is reported as an adjectival rating, ranging from “LOW Risk” to “HIGH Risk” on a five-point scale.
- Significant findings are documented in the Cost Factor on Form C and considered in the TMC Risk Rating.

TMC Cost Analysis: Step 1 of a Two-Step Competitive Process

- Initial cost analyses is 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 cost.
- Implementation threats are identified.
- Cost threat impacts to the proposed unencumbered reserves are assessed (see Cost Threat Matrix slide 33). The remaining unencumbered reserves are compared to the minimum required in the PEA.
- The entire panel participates in Cost deliberations. All information from the entire evaluation process is considered in the final cost assessment.
- Significant findings are documented in the Cost Factor on Form C and considered in the TMC Risk Rating.

TMC Cost Analysis: 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 an Unlikely/Possible/Likely/Very Likely/Almost Certain likelihood of a Very Minimal/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 for Phases A/B/C/D and Phase E will be set at a X% or a $Y as stated in the applicable PEA.

		Cost Impact (CI, % of PI-Managed Mission cost to complete Phases A/B/C/D or % of Phase E not including unencumbered cost reserves)					
		Very Minimal (1% < CI ≤ 2.5%)	Minimal (2.5% < CI ≤ 5%)	Limited (5% < CI ≤ 10%)	Moderate (10% < CI ≤ 15%)	Significant (15% < CI ≤ 20%)	Very Significant (CI > 20%)
Likelihood (L, %)	Almost Certain (L > 80%)						
	Very Likely (60% < L ≤ 80%)						
	Likely (40% < L ≤ 60%)						
	Possible (20% < L ≤ 40%)						
	Unlikely (L ≤ 20%)						

Note: For each proposal the percentages in the above table will be converted to dollars by the cost estimator.

TMC Panel Evaluation Findings Definitions

- **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 in the Form C.

TMC Risk Ratings

Based on the narrative findings, each proposal is assigned one of three risk ratings, defined as follows:

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.

Note: Only Major Findings are considered in the risk rating.

TMC Panel Products: Form C

For each proposal, the TMC evaluation results in a Form C that contains:

- Proposal title, PI name, and submitting organization;
- The TMC Feasibility of the Proposed Investigation Implementation adjectival risk rating from each evaluator of “LOW Risk”, “MEDIUM Risk” or “HIGH Risk”;
- Summary rationale for the median risk rating;
- Narrative findings supporting the adjectival risk rating in the form of specific major or minor strengths or weaknesses;
- Comments to the PI, Comments to the Selection Official (optional)

Categorization

Categorization Process and Proposal Categories

Upon completion of the evaluations, the results are presented to the Categorization Committee, composed wholly of Civil Servants and Intergovernmental Personnel Act appointees (some of whom may be from Government agencies other than NASA) and appointed by the Associate Administrator(s) for the appropriate Mission Directorate(s).

The Categorization Committee considers the evaluation results and, based on the evaluations, categorize the proposals in accordance with procedures required by NFS 1872.403-1(e). The categories are defined as:

- **Category I**. Well-conceived, meritorious, and feasible investigations pertinent to the goals of the program and the AO's objectives and offered by a competent investigator from an institution capable of supplying the necessary support to ensure that any essential flight hardware or other support can be delivered on time and that data can be properly reduced, analyzed, interpreted, and published in a reasonable time. Investigations in Category I are recommended for acceptance and normally will be displaced only by other Category I investigations.

Categorization Process and Proposal Categories

- **Category II**. Well-conceived, meritorious, and feasible investigations that are recommended for acceptance, but at a lower priority than Category I, whatever the reason.

- **Category III**. Meritorious investigations that require further development. Category III investigations may be funded for further development and may be reconsidered at a later time for the same or other opportunities.

- **Category IV**. Proposed investigations that are recommended for rejection for the particular opportunity under consideration, whatever the reason.

Evaluation Conclusion and AO Steering Committee

- Once Categorization has been completed, the Evaluation is considered complete unless any issue is questioned by a subsequent AO Steering Committee review.

- The AO Steering Committee will conduct an independent assessment of the evaluation and categorization processes regarding their compliance to established policies and practices, as well as the completeness, self- consistency, and adequacy of all supporting materials.

Selection

Selection Factors

The results of the proposal evaluations based on the criteria described in the SALMON-3 AO and the applicable PEA and the categorizations will be considered in the selection process.

The Selection Official(s) may take into account a wide range of programmatic factors in deciding whether or not to select any proposals and in selecting among top-rated proposals, including, but not limited to, planning and policy considerations, available funding, programmatic merit and risk of any proposed partnerships, and maintaining a programmatic balance across the mission directorate(s). While NASA develops and evaluates its program strategy in close consultation with the NASA community through a wide variety of advisory groups, NASA programs are evolving activities that ultimately depend upon the most current Administration policies and budgets, as well as programs' objectives and priorities that can change quickly based on, among other things, new discoveries from ongoing missions.

SALMON-3 Evaluation Plan Approvals

_____

Dr. Cindy L. Daniels
Director
NASA Science Office for Mission Assessments

_____

Dr. Michael New
Deputy Associate Administrator for Research
NASA Science Mission Directorate

Signed copy on file

2021 Astrophysics Explorers Program Elements Appendix Q

Evaluation Plan

Introduction

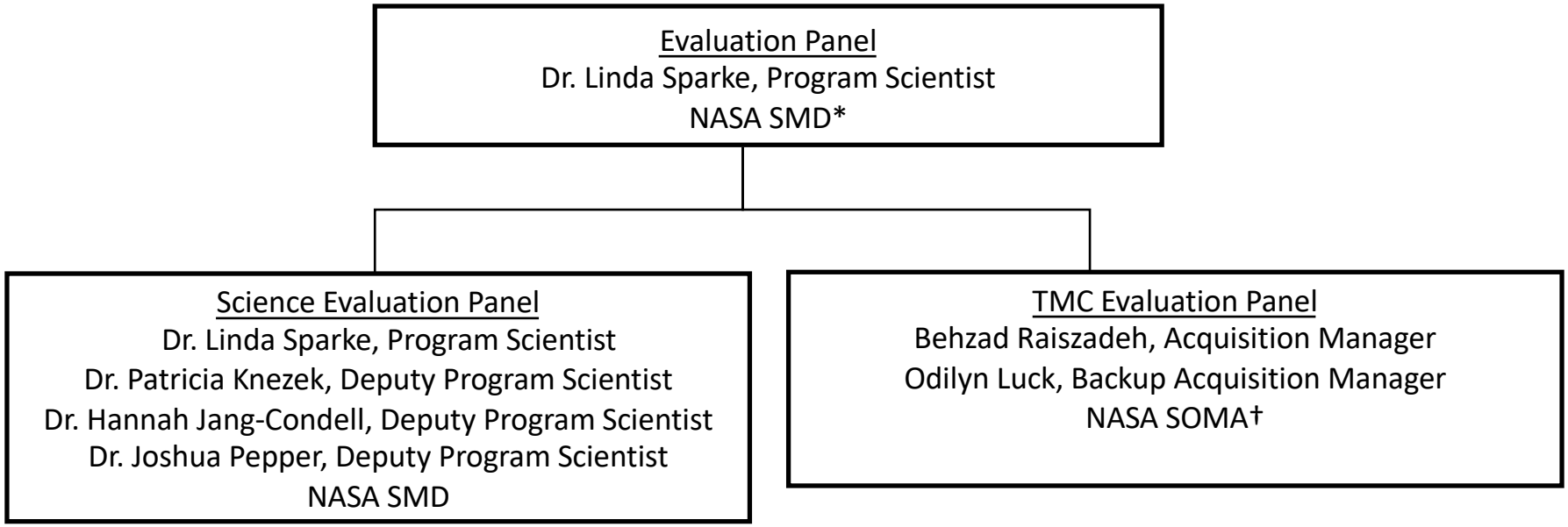
This Evaluation Plan, together with the SALMON-3 AO NASA SMD Evaluation Plan is a general guide to the evaluation of proposals submitted as a result of the 2021 Astrophysics Explorers PEA Q solicitation. This Evaluation Plan is the companion to the overall SALMON-3 AO NASA SMD Evaluation Plan, covers evaluation information directly from the PEA Q, and points out areas where there are differences between the SALMON-3 AO and PEA Q. These differences may include proposal requirements and evaluation criteria.

In the case of differences between the SALMON-3 AO and the 2021 Astrophysics PEA Q, and their respective evaluation plans, the 2021 Astrophysics Explorers PEA Q language takes precedence.

The 2021 Astrophysics Explorers PEA Q only solicits “science” investigations, so wherever the phrase “Science, Exploration, or Technology” appears in the AO or Evaluation Plan, it should be interpreted to only indicate “Science.” Science Evaluation Factors A-6 and B-7 will not be evaluated under this Solicitation.

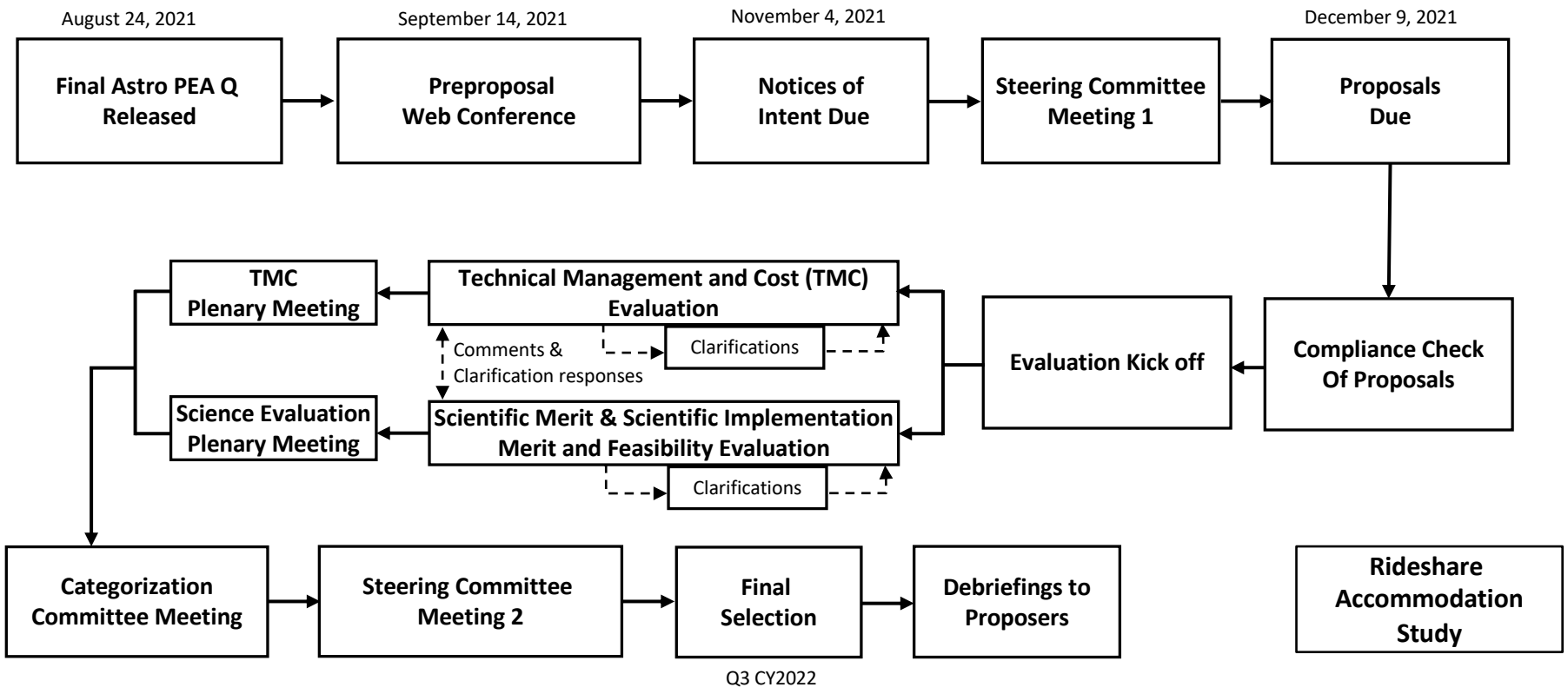
The “Astrophysics Explorers PEA Q Evaluation Plan” label in the top right hand corner indicates that the page addresses the 2021 Astrophysics Explorers PEA Q Evaluation Plan.

Evaluation Panel Organization



* Science Mission Directorate
† Science Office for Mission Assessments

Proposal Evaluation Flow



PEA Q Highlights (1)

- Factor A-3 of SALMON-3 has been deleted. Factor A-4 of SALMON-3 is renumbered as A-3.
- The wording of Factors B-1 and B-3 set forth in Section 7.2 of the SALMON-3 AO is amended to read:
  - **Factor B-1.** Merit of the proposed mission architecture, instruments, and measurement techniques for addressing the goals and meeting the science objectives. This factor includes how well the anticipated measurements support the goals and objectives; the appropriateness of the selected instruments and mission architecture for addressing the goals and objectives; and the appropriateness of the mission requirements for guiding development and ensuring scientific success.
  - **Factor B-3.** Data adequacy, analysis, and archiving. This factor includes the degree to which the proposed mission and instruments can provide the quality and quantity of data necessary to complete the investigation and meet the proposed science objectives. Additionally, it includes the merit of data analysis plans, including the fidelity of physical models required to connect the measurements to the science objectives; and plans for archiving, to preserve data and analysis of value to the science community. Considerations include planning and budget adequacy, with plans for well-documented, high-level data products and software usable to the entire science community; adequate resources for physical interpretation of data; reporting scientific results in the professional literature (e.g., refereed journals); and timely release of the data to the public domain.

PEA Q Highlights (2)

- Factor C-2 is amended to delete the evaluation of "ground systems and facilities." Ground systems and facilities are evaluated at Step 2 under Factor C-7.
  - Ground systems and facilities in Requirements B-29, B-36, B-38, B-44, and B-80 of SALMON-3 will not be evaluated under evaluation factor C-2.
  - Although ground systems and facilities are not evaluated under evaluation factor in C-2, associated schedule and cost impacts shall be included in the Step-1 proposals. See SALMON-3 Requirements B-34 and B-49 for schedule and Requirement B-55 for cost of the ground systems and facilities.

- In Section 5.2.4 of the PEA, no information on Science Enhancement Options (SEOs) is needed for the Step-1 proposal. Instead, plans and costs for proposed SEO activities must be defined in the Step 2 Concept Study Report. Factors A-5 and B-6 (Section 7.2 of the SALMON-3 AO) are therefore not evaluated.

- In Section 5.3.9 of the PEA, Space Systems Protection, detailed plans for recognizing and surviving interference, and protecting command uplink information will not be required for Step 1.

- Section 5.8 of the PEA provides that Institutional letters of commitment are not required for contributed support of Co-Is or collaborators, but all Co-Is and collaborators must indicate their commitment to the investigation through NSPIRES.

- The font requirements and page limits of SALMON-3 are superseded by Requirements Q-36 and Q-37 of the PEA.

PEA Q Highlights (3)

- Other than the changes listed in the previous two pages of PEA Q highlights, proposals will be evaluated according to the evaluation criteria set forth in Section 7.2 of the SALMON-3 AO, with the exceptions of Factor B-5 and Factor C-4 for Streamlined Class D missions, which are amended to delete evaluation of the PI's spaceflight experience.
  - In Factor B-5, the scientific expertise of the PI will be evaluated but not his/her experience with NASA missions. Comments about the managerial experience of the PI, and whether appropriate mentoring and support tools are in place, will be made to the Selecting Official but these comments shall not impact the "Investigation Implementation Merit" rating.
  - In Factor C-4, the capability of the management team will be evaluated as a whole, as opposed to assessing the capabilities of each of the Key Team Members independently. Comments about the managerial experience of the PI, and whether appropriate mentoring and support tools are in place, will be made to the Selecting Official but these comments shall not impact the "Technical, Management, and Cost Feasibility" rating.

PEA Q Highlights (4)

- The panel evaluating the third evaluation criterion, TMC Feasibility of the Proposed Investigation Implementation, will also provide comments to NASA regarding the extent to which proposed ESPA rideshare investigations are compatible with potential launch opportunities. These comments will not be considered for the TMC Feasibility of the Proposed Investigation Implementation evaluation.

  After the evaluation, but prior to the selection decision, NASA will perform an accommodation study of selectable ESPA rideshare investigation proposals to assess the extent to which the proposed investigations are compatible with potential ESPA interfaces and operations. This accommodation study will also consider the accommodations of selectable ESPA proposals for launch.

  After the evaluation, but prior to the selection decision, NASA will perform an accommodation study of selectable cislunar rideshare investigation proposals to assess the extent to which the proposed investigations are compatible with potential cislunar rideshare interfaces and operations. This accommodation study will also consider the accommodations of selectable cislunar proposals for launch.

- Half-step ratings for the Intrinsic Science Merit and Experiment Science Implementation Merit and Feasibility criteria will be used.

- Signatures of the PI and authorizing official are not required on the Graphic Cover Page.

Science Panel Procedures (1)

- The Science Panel will review a version of the proposal in which any export-controlled material has been redacted. Proposers are required to indicate such material; NRESS will redact the proposal pdf. In addition to the methods allowed in the Proprietary Data Protection Requirements of SALMON-3, the Science Panel may use NASA Google Docs for secure information exchange.
- Each Science Panel member evaluates proposals as directed by the Chair.
  - If special science expertise is required, the Science Panel may utilize non-panel/mail-in evaluators to assist with one or more proposals.
  - Non-panel/mail-in evaluators evaluates only those parts of proposals pertinent to their scientific specialties.
- Each proposal may be discussed by the evaluators in secure web conferences.
  - Findings in the form of Strengths and Weaknesses form the basis for initial panel discussions.
  - Each panel member provides an individual evaluation prior to the web conference.
  - During the web conference, proposals and the individual evaluations including non-panel/mail-in evaluations are discussed.
  - Following the web conference, the Lead Evaluator captures/synthesizes individual evaluations including discussions and generates the Draft Evaluation Forms including draft findings.
  - PMW clarification responses are received, a web conference is held to consider clarification responses. Draft findings are updated if applicable.

Science Panel Procedures (2)

- A Meeting of the Science Panel or sub-panels is held to refine and finalize the science evaluation forms.
  - The Science Panel or sub-panel compiles all of the findings for each proposal.
  - If the sub-panels meet separately, a web conference of the sub-panel chairs, or of sub-panel members explicitly tasked with consistency, will review the draft findings of all sub-panels for consistency ahead of the sub-panel meetings.
  - For each proposal, the Chair or designated Lead Evaluator leads the discussion, summarizes the proposed investigation, and documents the results.
  - Evaluations of all proposals are reviewed during the Science Panel Meeting to ensure that standards have been applied uniformly and in an appropriate and fair manner.
  - After the discussion, each member of the Panel or sub-panel assigns a merit rating for Science (Form A) and for Science Implementation and Feasibility (Form B) to each proposal. Non-panel evaluators do not assign ratings.

Clarification Process of Potential Major Weaknesses

- NASA will request clarifications of Potential Major Weaknesses (PMWs) identified by the evaluation panels in all three criteria; Intrinsic Science Merit of the Proposed Investigation, Experiment Science Implementation Merit and Feasibility of the Proposed Investigation, and TMC Feasibility of the Proposed Investigation Implementation. NASA will request such clarification uniformly, from all proposers.- All requests for clarification from NASA and the proposers' responses are in writing.
  - The ability of proposers to provide clarification to NASA is limited to the guidelines described in Charts 55 - 57.
  - PIs whose proposals have no PMWs are informed that no PMWs have been identified at that time
  - The PIs are given at least 2 working days to respond to the request for PMW clarification.

PMW Clarification Process: Modifications from Previous AOs

Section 7.1.1 of the SALMON-3 AO states that "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." In particular, before finalizing the evaluation, NASA will request clarification on specific, Potential Major Weaknesses (PMWs) in the *Intrinsic Science Merit of the Proposed Investigation* (see Section 7.2.2), and the *Experiment Scientific Implementation Merit and Feasibility of the Proposed Investigation* (see Section 7.2.3), and the *TMC Feasibility of the Proposed Investigation Implementation* (see Section 7.2.4) that have been identified in the proposal. NASA will request clarification in a uniform manner from all proposers. Proposers will be allowed up to eight combined pages in total (with some restrictions) for clarifications of the Potential Major Weaknesses (PMWs) associated with the *Scientific Merit* (A-factors) plus *Scientific 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 of the PMWs associated with the *TMC Feasibility of the Proposed Mission Implementation* (C-factors) evaluation criterion. These clarifications may include text, tables and figures to address the PMWs and to provide additional information. The full set of clarification responses to the factors above will be considered by the Science Panel and the Technical Management and Cost (TMC) panel. Only the responses will be provided to the other panel but not the PMWs. [Revised April 1, 2022]

PMW Clarification Process Requirements (1 of 2)

Clarifications Responses must conform to the following requirements:

Requirement 1: Proposers shall submit only two Clarification Response Documents; i.e., one for Intrinsic Science Merit of the Proposed Investigation, and Experiment Scientific Implementation Merit and Feasibility of the Proposed Investigation; and one for the TMC Feasibility of the Proposed Investigation Implementation.

Requirement 2: The Clarification Response Document shall be a single unlocked (e.g., without digital signatures) searchable Adobe Portable Document Format (PDF) file, composed of the response text, figures, and/or tables. Images (e.g., figures and scans) shall be converted into machine-encoded text using optical character recognition. Animations shall not be included. Links to materials outside of the response are not permitted. Do not insert any comment fields.

Requirement 3: The Clarification Response Document shall be presented in 8.5 x 11 inch paper (or A4). Text shall not exceed 5.5 lines per vertical inch and page numbers shall be specified. Margins at the top, both sides, and bottom of each page shall be no less than 1 inch if formatted for 8.5 x 11 inch paper; no less than 2.5 cm at the top and both sides, and 4 cm at the bottom if formatted for A4 paper. Type fonts for text, tables, and figure captions shall be no smaller than 12-point (i.e., no more than 15 characters per horizontal inch; six characters per horizontal centimeter). Fonts used within figures shall be no smaller than 8-point.

PMW Clarification Process Requirements (2 of 2)

Requirement 4: For the combined responses to Scientific Merit of the Proposed Investigation (A-factors) and Scientific Implementation Merit and Feasibility of the Proposed Investigation (B-factors) PMWs, the Clarification Response Documents shall not exceed eight pages. For the TMC Feasibility of the Proposed Investigation Implementation PMWs, the Clarification Response Documents shall not exceed six pages. Text, table(s) and figure(s) are permitted, however all material shall be within the page limits specified above and limitations in Requirement 3.

Requirement 5: The Clarification Response Document shall not contain International Traffic in Arms Regulations (ITAR), Export Administration Regulations (EAR), or classified material.

Requirement 6: Each PMW shall be addressed and each clarification response labelled with the PMW number provided. Each PMW clarification response shall only contain information relevant to the PMW.

Requirement 7: The proposers are free to provide any additional information on any criteria or requirements relevant to the proposed investigation, e.g., for TMC Feasibility of the Proposed Investigation Implementation, advances in proposed technologies since proposal submission. However, this response together with the PMW clarification responses shall fulfill requirements above and not exceed the six total page limitation per Clarification Response Document.

Requirement 8: In support of each PMW clarification response, proposers shall not provide more than two references; references are restricted to peer reviewed literature. In support of any additional information response, proposers shall not provide more than three additional references; references are restricted to peer reviewed literature. Proposers shall not provide URLs with any of the responses.

TMC Cost Analysis: Step 1 of a Two Step Competitive Process

- Initial cost analyses is 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 cost.
- Implementation threats are identified.
- Cost threat impacts to the proposed unencumbered reserves are assessed (see Cost Threat Matrix slide 58). The remaining unencumbered reserves are compared to the minimum required in the PEA.
- The entire panel participates in Cost deliberations. All information from the entire evaluation process is considered in the final cost assessment.

TMC Cost Analysis: 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 an Unlikely/Possible/Likely/Very Likely/Almost Certain likelihood of a Very Minimal/Minimal/Limited/ Moderate/Significant/Very Significant cost impact being realized during development and/or operations, which results in a reduction from the proposed unencumbered reserves."

- 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 threat.

The cost threat matrix defines the adjectives that describe the *likelihood* and *cost impact*.

The minimum cost threat threshold is $400K for Phases B/C/D and $250K for Phase E.

	Likelihood of Occurance	Cost Impact (CI) % of the PI-Managed Mission Cost to complete phases B/C/D or % of Phase E not including unencumbered cost reserves or contributions				
		Minimal ($0.40M < 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%)					

Note: For each proposal the percentages in the above table will be converted to dollars by the cost estimator.

Forms A, B, and C Ratings

- **Forms A & B Rating:** Polling will be held twice on the Form A and B grades. The individual grades from the final polling are recorded and reported. The final grade is set equal to median of the final polling. A median score that falls between two grades will be "rounded" in the direction of the mean score; if the mean and median are equal, the score will be "rounded" towards the less favorable grade. If there is a divergence of opinion, there may be additional rounds of discussion and polling. Half-step ratings for the Intrinsic Science Merit and Experiment Science Implementation Merit and Feasibility criteria will be used.

- **Form C Rating:** Form C will be reviewed three times. Polling will be held twice on the Form C risk rating. The final polling is recorded and reported. For the final polling, the individual grades are recorded, the median calculated and the final grade recorded which reflects the Form C Risk rating of the median of the polling. A median score that falls between two risk ratings will be "rounded" to the higher risk rating. If there is a divergence of opinion, there may be additional rounds of discussion and polling.

Approvals

Behzad Raiszadeh
Acquisition Manager, Science Office for Mission Assessments

Cindy Daniels
Director, Science Office for Mission Assessments

Linda Sparke
Program Scientist
Astrophysics Division, SMD

Paul Hertz
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Astrophysics Division, SMD

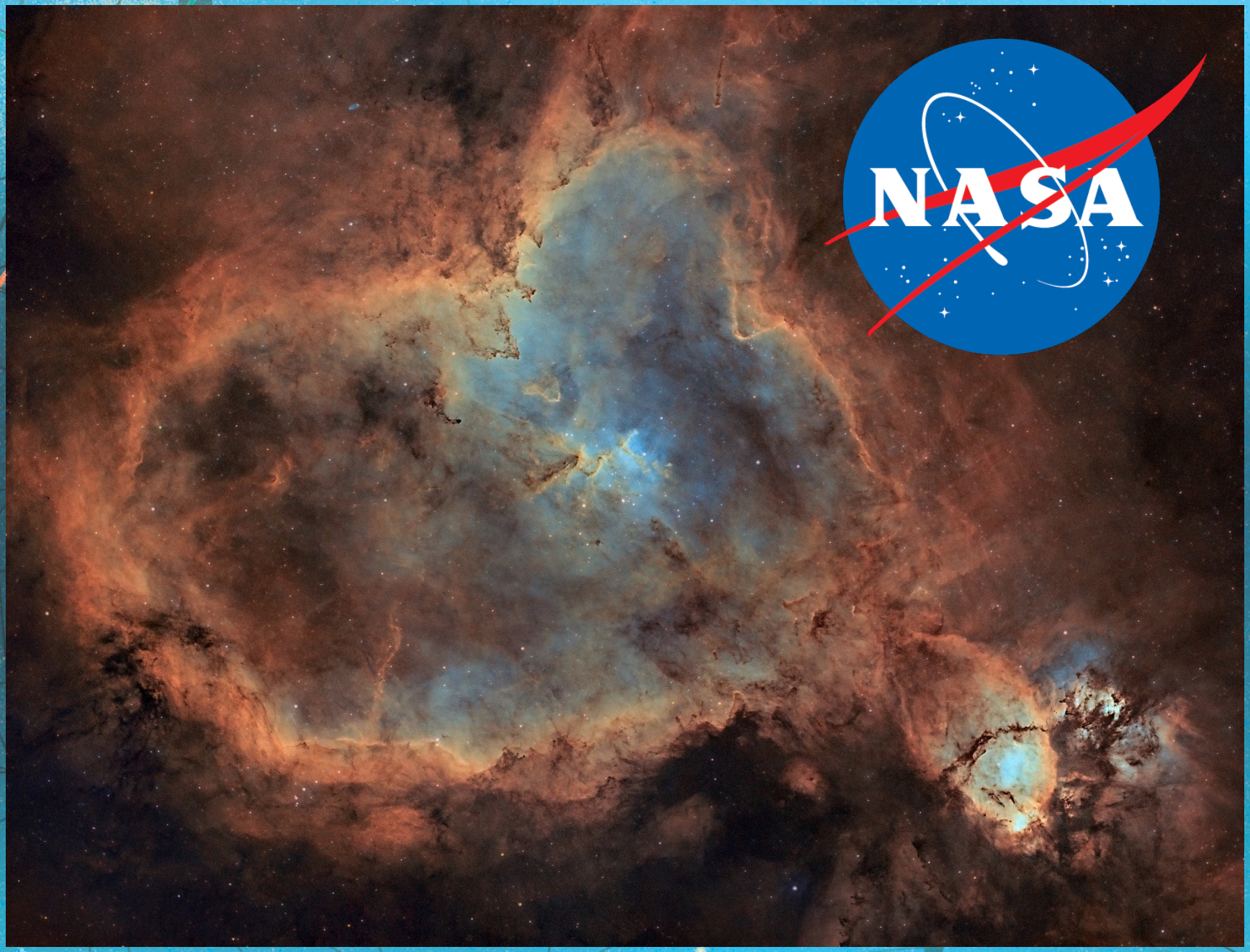
Michael New
Deputy Associate Administrator for Research, SMD

Signed copy on file

Change Log

Rev #	Date	Change
1	April 1, 2022	Page 47 – added a line between the Science and TMC panels labeled "Comments & PMW Responses" Page 55 – added a statement to the bottom of the page regarding the PMW Responses

Rev #	Date	Change
2	May 16, 2022	Page 46 – added Dr. Joshua Pepper to Science Evaluation Panel Leadership Team. Added Odilyn Luck as the TMC backup Acqusition Manager to TMC evaluation.


NASA