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# 2016 Heliophysics Explorer Mission of Opportunity Evaluation Plan

## Second Stand Alone Missions of Opportunity Notice (SALMON-2) Program Element Appendix (PEA) Q

June 28, 2016

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# Introduction

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- This package includes both the SALMON-2 Evaluation Plan and the 2016 Heliophysics Explorer Mission of Opportunity (MO) PEA Q Evaluation Plan.
  - The SALMON-2 Evaluation Plan covers evaluation information directly from the SALMON-2 and from the evaluation processes conducted by the Science Panel and Technical Management and Cost (TMC) Panel.
  - The approval page for the SALMON-2 Evaluation Plan is on page 57.
  - The MO PEA Q Evaluation Plan covers evaluation information directly from the PEA Q and from the evaluation processes conducted by the Science and TMC Panels.
  - The approval page for the MO PEA Q Evaluation Plan is on the last page of this presentation.
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# Stand Alone Mission of Opportunity Notice (SALMON-2)

## Evaluation Plan

June 26, 2015



# Introduction

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- The SALMON-2 Evaluation Plan covers evaluation information directly from the SALMON-2 and from the evaluation processes conducted by the Science Panel and Technical Management and Cost (TMC) Panel.
- The Evaluation Plan for a specific Program Element Appendix (PEA) is a companion document.
- “**SALMON-2**” in the bottom left hand corner indicates that the page belongs to the SALMON-2 Evaluation Plan.



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# General Evaluation Requirements and Compliance



# Principles for Evaluation

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- 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.
- Ratings shall reflect the written strengths and weaknesses.
- Everyone involved in the review process is expected to act in an unbiased objective manner; advocacy for particular proposals is not appropriate.



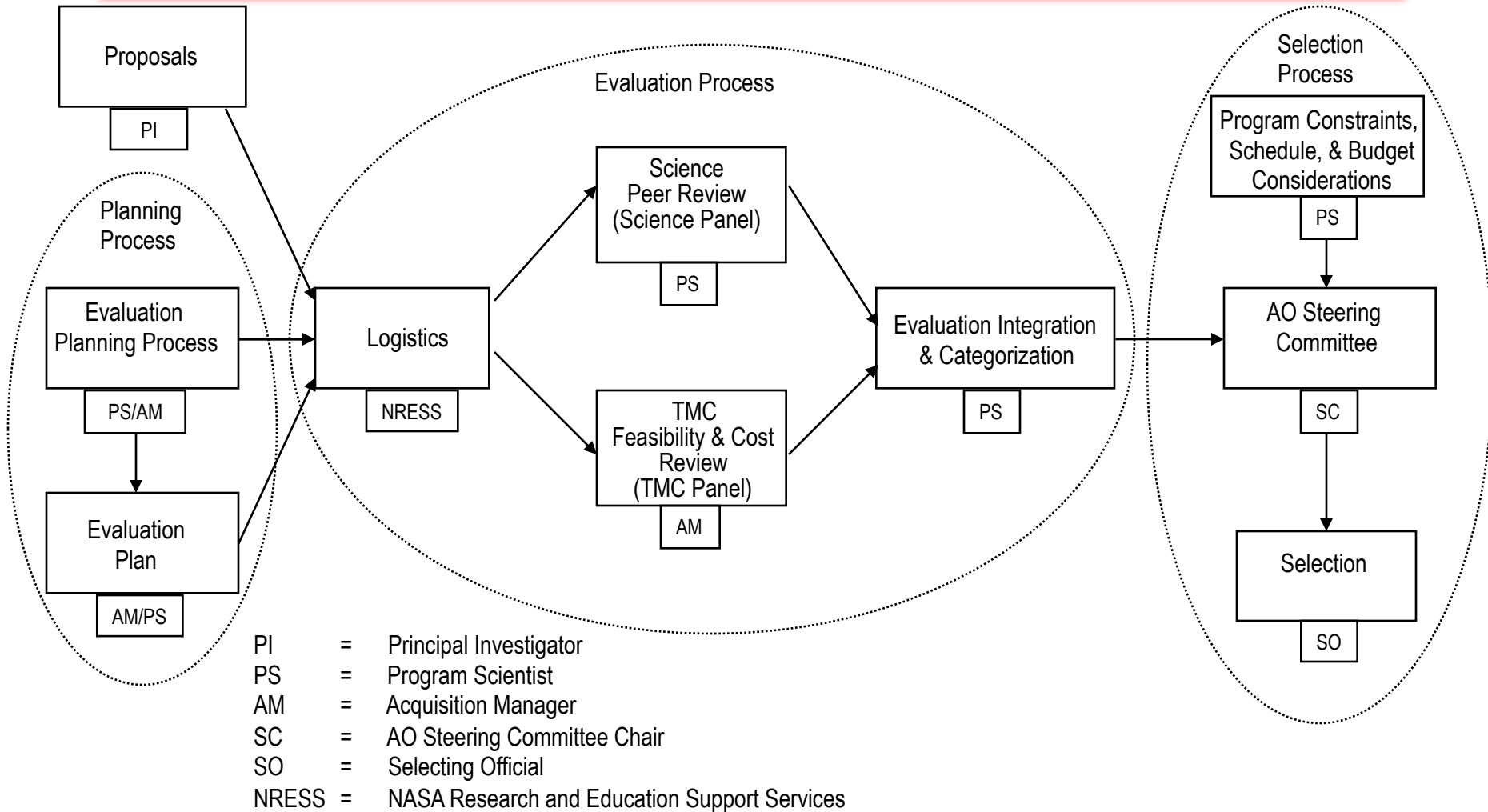
# General Evaluation Ground Rules

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- All proposals will be reviewed to uniform standards established in the Announcement of Opportunity (AO), and without comparison to other proposals.
- All evaluators will be experts in the areas that they evaluate.
- Specialist Evaluators (to provide special technical expertise to the TMC Panel) and non-panel/mail-in Reviewers (to provide special science expertise to the Science Panel) may be utilized, respectively, based on need for expertise in a specific technology/ engineering or science that is proposed.



# Step One Evaluation Responsibilities







# Conflicts of Interest (COI) Prevention Requirements

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- NRESS will cross-check 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.
- Cornell Technical Services (CTS) will cross-check all TMC Panel members against the lists of personnel and organizations identified in each proposal submitted to determine whether any organizational COI exists.
- Additionally, all evaluators must divulge any other financial, professional, or potential personal conflicts of interest, and whether they work for a profit-making company that directly competes with any profit-making proposing organization.
- All Civil Service evaluators will self-certify their COI status by reviewing a combined listing of individuals and organizations associated with the proposals. The TMC evaluators must notify the SOMA Acquisition Manager, in case there is a potential conflict. The Science evaluators must notify the Program Scientist, in case of a potential conflict.



# Conflicts of Interest (COI) Prevention Requirements

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- All known 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. Any potential COI issue is discussed with the Program Scientist and the 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 conflict of interest 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

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- All proposal and evaluation materials are considered proprietary.
- Viewing of proposal materials will be only on a need-to-know basis.
- Each evaluator will sign 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 teleconferences among TMC Panel evaluators will be conducted *via* secure telephone lines.
- Evaluators' electronic and paper evaluation materials will be deleted/destroyed when the evaluation process is complete. Archival copies will be maintained in the SOMA vault.



# Evaluation Criteria and Selection Factors: SALMON-2 AO

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- Evaluation Criteria from SALMON-2 AO NNH12ZDA006O:
  1. Intrinsic Science, Exploration, or Technology Merit of the Proposed Investigation (section 7.2.2);
  2. Experiment Science, Exploration, or Technology Implementation Merit and Feasibility of the Investigation (section 7.2.3);
  3. TMC Feasibility of the Investigation Implementation, including Cost Risk (section 7.2.4).
- Weighting: the first criterion is weighted approximately 40%; the second and third criteria are weighted approximately 30% each.
- Other Selection Factors (section 7.3):
  - Programmatic factors
  - PI-Managed Mission Cost



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# Compliance Checklist SALMON-2 AO Appendix F



# Compliance Criteria

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## Administrative:

1. Proposal submitted through NSPIRES on time
2. Meets page limits
3. Meets general requirements for digital file format (single searchable, bookmarked PDF, less than 25 MB)
4. Meets general requirements for display format and completeness (maximum 55 lines text/page, maximum 15 characters/inch – approximately 12 pt font, 1 inch margins)
5. Required appendices included; no additional appendices
6. Budgets are submitted in required formats
7. All individual team members who are named on the cover page indicate their commitment through NSPIRES
8. All export-controlled information has been identified



# Compliance Criteria

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## Science, Exploration, or Technology:

9. Addresses solicited science, exploration, or technology programs
10. Requirements traceable from objectives to measurements to instruments to mission
11. Baseline investigation and threshold investigation defined



# Compliance Criteria

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## Technical:

12. Complete spaceflight mission (Phases A-F) proposed
13. Team led by a single PI
14. Includes commitment for E/PO program (if PEA requires)
15. PI-Managed Mission Cost within cost cap (if PEA specifies a cap)
16. Co-Investigator costs in budget
17. Launch date prior to launch deadline (if PEA specifies a deadline)
18. Includes table describing non-U.S. participation
19. Includes letters of commitment from funding agencies for non-U.S. participating institutions
20. Includes letters of commitment from all U.S. organizations offering contributions
21. Includes letters of commitment from all major partners in the proposals, regardless of source of funding

Note: From SALMON-2 Section 5.10.1.2, 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.





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# Science Evaluation Requirements



# Science Panel Composition and Organization

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- 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 Intrinsic Science Merit and Experiment Science Implementation Merit and Feasibility.
  - The science evaluation will be conducted *via* one Science Panel, but sub-panels may be employed, depending on the number and variety of proposed investigations.
    - Any sub-panel will be 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 will be reviewed by assigned panel members.
    - The Lead Reviewer for each proposal will lead the discussion.
    - At the request of the Lead Reviewer, a Supporting Reviewer will take notes on the discussion.
  - The TMC Panel may provide comments and questions to the Science Panel.
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# Science Panel Procedures

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- Each member of the Science Panel will review proposals as directed by the Chair.
  - If special science expertise is required, the Science Panel may utilize non-panel/mail-in reviewers to assist with one or more proposals.
  - Non-panel/mail-in reviewers will evaluate only those parts of proposals pertinent to their scientific specialties.
- Each proposal may be discussed by the reviewers in a telecon.
  - Findings in the form of Strengths and Weaknesses form the basis for initial panel discussions.
  - Each reviewer provides an individual review prior to the telecon.
  - The telecon discusses the proposal and the reviews by the individual reviewers including non-panel reviewers.
  - Following the telecon, the Lead Reviewer captures/synthesizes individual evaluations including discussion and generates the Draft Evaluation including draft findings.
  - The draft findings form the basis for the clarification of draft major weaknesses.
  - There is no overall merit grade assigned prior to receiving the responses to the clarification requests.



# Science Panel Procedures

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- A Science Panel Meeting will be held upon completion of Science Evaluation for all proposals.
  - The Science Panel will compile all of the findings for each proposal.
  - For each proposal, the Chair or designated Lead Reviewer will lead the discussion, summarize the proposed investigation, and document the results.
  - The clarifications provided by the PIs will be considered and the findings will be adjusted if warranted.
  - 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 Reviewer synthesizes and documents Panel evaluations.



# Science Panel Products

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For each proposal, the Science evaluation will result in:

- Form A
  - Proposal title, PI name, and submitting organization;
  - Proposal summary;
  - Based on findings, Intrinsic Science Merit adjectival ratings from each evaluator, ranging from “Excellent” to “Poor”;
  - Summary rationale for the median rating;
  - Narrative findings, identified as major or minor strengths or weaknesses;
  - Comments to PI, comments to NASA. (optional)
  
- Form B
  - Proposal title, PI name, and submitting organization;
  - Based on findings, Experiment Science Implementation Merit and Feasibility adjectival ratings from each evaluator, ranging from “Excellent” to “Poor”;
  - Summary rationale for the median rating;
  - Narrative findings, identified as major or minor strengths or weaknesses;
  - Comments to PI, comments to NASA. (optional)



# Science Panel Evaluation Factors

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## Criterion A: Intrinsic Science, Exploration, or Technology Merit of the Proposed Investigation:

- Factors from SALMON-2 AO section 7.2.2
  - 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



## Science Panel Evaluation Factor A-1

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Compelling nature and priority of the proposed investigation's science, exploration, or technology goals and objectives.

This factor includes the clarity of the goals and objectives; how well the goals and objectives reflect program, Agency, and National priorities; the potential impact of the investigation on program, Agency, and National science, exploration, or technology objectives; and the potential for fundamental progress, as well as filling gaps in our knowledge relative to the current state of the art.



## Science Panel Evaluation Factor A-2

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Programmatic value of the proposed investigation. This factor includes the unique value of the investigation to make science, exploration, or technology progress in the context of other ongoing and planned missions; the relationship to the other elements of NASA's programs; how well the investigation may synergistically support ongoing or planned missions by NASA and other agencies; and the necessity for a space mission to realize the goals and objectives.





## Science Panel Evaluation Factor A-3

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Likelihood of science, exploration, or technology success.

This factor includes how well the anticipated measurements support the goals and objectives; the adequacy of the anticipated data to complete the investigation and meet the goals and objectives; and the appropriateness of the mission requirements for guiding development and ensuring success.



## Science Panel Evaluation Factor A-4

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Science, exploration, or technology value of the Threshold Investigation. This factor includes the intrinsic value of the Threshold Investigation using the standards in the first factor of this section and whether that value is sufficient to justify the proposed cost of the investigation.



# Science Panel Evaluation Factors

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## Criterion B: Experiment Science, Exploration, or Technology Implementation Merit and Feasibility of the Investigation:

- Factors from SALMON-2 AO section 7.2.3
  - 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 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



## Science Panel Evaluation Factor B-1

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Merit of the instruments and investigation design for addressing the science, exploration, or technology goals and objectives. This factor includes the degree to which the proposed investigation will address the goals and objectives; the appropriateness of the selected instruments and investigation design for addressing the goals and objectives; the degree to which the proposed instruments and investigation can provide the necessary data; and the sufficiency of the data gathered to complete the science, exploration, or technology investigation.



## Science Panel Evaluation Factor B-2

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Probability of technical success. This factor includes the maturity and technical readiness of the instruments; the adequacy of the plan to develop the instruments within the proposed cost and schedule; the robustness of those plans, including recognition of risks and mitigation plans for retiring those risks; the likelihood of success in developing any new technology that represents an untested advance in the state of the art; the ability of the development team – both institutions and individuals – to successfully implement those plans; and the likelihood of success for both the development and the operation of the instruments within the investigation design.



## Science Panel Evaluation Factor B-3

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Merit of the data and/or sample analysis plan. This factor includes the merit of plans for data and/or sample analysis, data archiving, and/or sample curation to meet the goals and objectives; to result in the publication of discoveries in the professional literature; and to preserve data and samples of value to the research and development community.

Considerations in this factor include assessment of planning and budget adequacy and evidence of plans for well-documented, high-level data products and software useable to the entire research and development community; assessment of adequate resources for physical interpretation of data;



## Science Panel Evaluation Factor B-3 cont'd

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an assessment of the planning and budget adequacy and evidence of plans for the preliminary evaluation and curation of any returned samples; reporting science, exploration, or technology results in the professional literature (*e.g.* refereed journals); and assessment of the proposed plan for the timely release of the data to the public domain for enlarging its impact.



## Science Panel Evaluation Factor B-4

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Science, exploration, or technology resiliency. This factor includes both developmental and operational resiliency. Developmental resiliency includes the approach to descoping the Baseline Investigation to the Threshold Investigation in the event that development problems force reductions in scope. Operational resiliency includes the ability to withstand adverse circumstances, the capability to degrade gracefully, and the potential to recover from anomalies in flight.





## Science Panel Evaluation Factor B-5

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Probability of investigation team success. This factor will be evaluated by assessing the experience, expertise, and organizational structure of the investigation team and the experiment design in light of any proposed instruments. The role of each Co-Investigator will be evaluated for necessary contributions to the proposed investigation; the inclusion of Co-Is who do not have a well defined and appropriate role may be cause for downgrading during evaluation.



## Science Panel Evaluation Factor B-6

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Merit of any Science Enhancement Options (SEOs), if proposed. This factor includes assessing the appropriateness of activities selected to enlarge the impact of the investigation; the potential of the selected activities to enlarge the impact of the investigation; and the appropriate costing of the selected activities. The peer review panel will inform NASA whether the evaluation of the proposed SEO(s) impacted the overall rating for experiment implementation merit and feasibility. Lack of an SEO will have no impact on the proposal's overall rating for experiment implementation merit and feasibility.



## Science Evaluation Product: Findings

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- **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.



# Form A and B Grade Definitions

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## Form A and B Grade 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).



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## TMC Evaluation Requirements



# TMC Panel Composition and Organization

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- The Acquisition Manager, who is a Civil Servant in the NASA Science Office for Mission Assessments (SOMA) at NASA Langley Research Center, 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 findings.
- Additionally, specialist evaluators may be called upon in cases where technical expertise that is not represented on the panel is needed.
  - Specialist evaluators evaluate only those parts of a proposal that are specific to their particular expertise.
  - Specialist evaluators provide only findings; they do not provide ratings.



# TMC Panel Evaluation Factors

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## Criterion C: TMC Feasibility of the Investigation Implementation, Including Cost Risk:

- Factors from SALMON-2 AO section 7.2.4 – include the following, as applicable to the investigation being proposed
  - 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 Panel Evaluation Factor C-1

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Adequacy and robustness of the instrument implementation plan. The maturity and technical readiness of the instrument complement will be assessed, as will the ability of the instruments to meet investigation requirements. This factor includes an assessment of the instrument design, accommodation, interface, heritage, and technology readiness. This factor includes an assessment of the instrument hardware and software designs, heritage, and margins. This factor includes an assessment of the proposer's understanding of the processes, products, and activities required to accomplish development and integration of the instrument complement. This factor also includes adequacy of the plans for instrument systems engineering and for dealing with environmental concerns. This factor includes an assessment of plans for the development and use of new instrument technology and the adequacy of backup plans to ensure success within the proposed cost and schedule when technologies having a TRL less than 6 are proposed.





## TMC Panel Evaluation Factor C-2

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- Adequacy and robustness of the investigation design and plan for operations. This factor includes an assessment of the overall investigation design and investigation architecture, the spacecraft design and design margins (including margins for launch mass, delta-V, and propellant), the concept for operations (including communication, navigation/tracking/trajectory analysis, and ground systems and facilities), and the plans for launch services. This factor includes investigation resiliency – the flexibility to recover from problems during both development and operations – including the technical resource reserves and margins, system and subsystem redundancy, and reductions and other changes that can be implemented without impact to the Baseline Investigation. This factor will be applied only to the extent that it is appropriate for the proposals solicited by the applicable PEA.
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## TMC Panel Evaluation Factor C-3

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Adequacy and robustness of the flight systems. This factor includes an assessment of the flight hardware and software designs, heritage, and margins. This factor includes an assessment of the proposer's understanding of the processes, products, and activities required to accomplish development and integration of all elements (flight systems, ground and data systems, etc.) This factor includes an assessment of the adequacy of the plans for spacecraft systems engineering, qualification, verification, mission assurance, launch operations, and entry/descent/landing. This factor includes the plans for the development and use of new technology and the adequacy of backup plans to ensure the success of the investigation when technologies having a TRL less than 6 are proposed.



## TMC Panel Evaluation Factor C-3 cont'd

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The maturity and technical readiness of the spacecraft, subsystems, and operations will be assessed. The adequacy of the plan to mature systems within the proposed cost and schedule, the robustness of those plans, including recognition of risks and mitigation plans for retiring those risks, and the likelihood of success in developing any new technologies will be assessed. This factor will be applied only to the extent that it is appropriate for the proposals solicited by the applicable PEA.



## TMC Panel Evaluation Factor C-4

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Adequacy and robustness of the management approach and schedule, including the capability of the management team. This factor includes: the adequacy of the proposed organizational structure and WBS; the management approach including project level systems engineering; the roles, qualifications, and experience of the PI, PM, other named key management team members, and implementing organization, investigation management team, and known partners; the commitment, spaceflight experience, and relevant performance of the PI, PM, other named key management team members, and implementing organization, investigation management team, and known partners against the needs of the investigation; the commitments of partners and contributors; and the team's understanding of the scope of work covering all elements of the investigation, including contributions.



## TMC Panel Evaluation Factor C-4 cont'd

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Also evaluated under this factor is the adequacy of the proposed risk management approach, including any risk mitigation plans for new technologies, any long-lead items, and the adequacy and availability of any required manufacturing, test, or other facilities. The approach to any proposed descoping of investigation capabilities will be assessed against the proposed Baseline Investigation. The plans for managing the risk of contributed critical goods and services will be assessed, including the plans for any international participation, the commitment of partners and contributors, as documented in Letters of Commitment, and the adequacy of contingency plans for coping with the failure of a proposed cooperative arrangement or contribution. This factor also includes assessment of proposal elements such as the relationship of the work to the project schedule, the project element interdependencies, the associated schedule margins, and an assessment of the likelihood of launching by the proposed launch date. Also evaluated under this factor are the proposed project and schedule management tools to be used on the project.

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## TMC Panel Evaluation Factor C-5

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- Adequacy and robustness of the cost plan, including cost feasibility and cost risk. This factor includes proposal elements such as cost, cost risk, cost realism, and cost completeness including assessment of the basis of estimate, the adequacy of the approach, the methods and rationale used to develop the estimated cost, the discussion of cost risks, the allocation of cost reserves by phase, and the team's understanding of the scope of work (covering all elements of the investigation, including contributions). Proposals will be evaluated for the adequacy of the cost reserves and whether proposals with inadequate cost reserves demonstrate a thorough understanding of the cost risks. This factor also includes an assessment of the proposed cost relative to estimates generated using parametric models and analogies. Also evaluated under this factor are the proposed cost management tools to be used on the project.



## TMC Panel Product: Form C

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

- Proposal title, PI name, and submitting organization;
- An adjectival risk rating from each evaluator of “LOW Risk”, “MEDIUM Risk” or “HIGH Risk” for the TMC Feasibility of the Investigation Implementation, Including Cost Risk that is derived based on the findings;
- Summary rationale for the median risk rating;
- Narrative findings, identified as major or minor strengths or weaknesses;
- Comments to the PI, comments to NASA, comments to the Science Panel. (optional)



# TMC Evaluation Product: Findings

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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 in the Form C.





## TMC Evaluation Product: Risk Ratings

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Based on the narrative findings, each proposal will be 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 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.

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## TMC Cost Analysis – Step 1 of a 2-Step Process

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- Initial cost analyses will be accomplished on the basis of information provided in the proposals (consistency, completeness, proposed basis of estimate, contributions, use of full cost accounting, maintenance of reserve levels, cost management, etc.).
- Cost will be evaluated with at least one cost model.
- Cost threats, risks, and risk mitigations will be analyzed.
- The Cost Risk is integrated into the overall TMC risk rating.
  - Significant findings from the Cost Evaluation Summary that affect the TMC risk rating will be documented as Major Strengths and Major Weaknesses on the Form C and considered in the Form C risk rating.
  - Cost Risk will **not** have an adjectival rating separate from the TMC risk rating.
  - Draft Cost Evaluation Summaries and Forms Cs will be completed prior to the Plenary.
- During the TMC Plenary meeting, the entire panel will participate in Cost deliberations.



# TMC Cost Analysis - Step 1 of a 1-Step Process

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- Initial cost analyses will be 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, and cost management, etc.).
- Cost will be evaluated with at least one model.
- Cost threats, risks, and risk mitigations will be analyzed.
- Cost realism (a.k.a. “cost risk”) is based on models, analogies, heritage, and grass roots information from proposals.
  - Cost Realism is reported as an adjectival rating, ranging from “LOW Risk” to “HIGH Risk” on a five-point scale.
- Draft Cost Evaluation Summaries and Form Cs will be completed prior to the Plenary.
- During the TMC Plenary, the entire panel will participate in Cost deliberations:
  - All information from the entire evaluation process will be considered in the final cost assessment.
- Significant findings from the Cost Evaluation Summaries will be documented in the Cost Factor on Form C and considered in the Form C risk rating.



# Cost Risk Definitions

(only used in Step 1 of a 1-Step Process)

Cost Risk	Definition
LOW	<p><b><i>Cost Envelope is adequate – expect success.</i></b></p> <ul style="list-style-type: none"> <li>- The proposer's estimate (<i>with reserves</i>) agrees closely with the work, staffing, and schedule proposed, fits within the program cap and any other budget constraints, and is verified by TMC independent analysis.</li> <li>- The proposed cost reserve is adequate to address cost threats identified by TMC, and to fund unexpected needs.</li> <li>- The resource management plan indicates strong, active management of resources throughout implementation.</li> </ul>
LOW/ MEDIUM	<p><b><i>Cost Envelope is somewhat tight, but project should succeed.</i></b></p> <ul style="list-style-type: none"> <li>- TMC identified one or more significant cost threats or weaknesses with regard to the proposer's estimate, cost reserves, and/or resource management. Overall impact of identified threats and weaknesses should be manageable.</li> <li>- TMC independent analysis verifies proposer's costs.</li> </ul>
MEDIUM	<p><b><i>Cost Envelope is tight. Success requires diligent oversight of resources.</i></b></p> <ul style="list-style-type: none"> <li>- TMC identified one or more significant cost threats or weaknesses with regard to the proposer's estimate, cost reserves, and/or resource management. Cost impact of threats may be underestimated by proposer. Overall impact of identified threats and weaknesses should be manageable.</li> <li>- TMC independent analysis verifies some or most of proposer's costs.</li> </ul>
MEDIUM /HIGH	<p><b><i>Cost Envelope is very tight. It is likely the project will require more funding.</i></b></p> <ul style="list-style-type: none"> <li>- TMC identified one or more major cost threats or weaknesses with regard to the proposer's estimate, cost reserves, and/or resource management. Cost impact of threats appears underestimated by proposer. Overall impact of identified threats and weaknesses will be challenging to manage within funding and/or schedule constraints.</li> <li>- TMC independent analysis could not verify significant elements of proposer's costs.</li> </ul>
HIGH	<p><b><i>Project exceeds the Cost Envelope and is expected to require substantially more funding.</i></b></p> <ul style="list-style-type: none"> <li>- TMC identified one or more major cost threats or weaknesses in the proposer's estimate, cost reserves, and/or resource management. Overall impact of identified threats and weaknesses exceeds proposed resources and/or available resources to cover them. Threats are not acknowledged, or are underestimated by proposer.</li> <li>- TMC independent analysis could not verify proposer's costs.</li> </ul>



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## Classification



# Categorization

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- Upon completion of the evaluations, the results will be presented to the Categorization Committee, an *ad hoc* subcommittee of the SMD AO Steering Committee composed solely of Civil Servants and appointed by the SMD Deputy Associate Administrator.
- This committee will consider the peer review results and, based on the evaluations, will categorize each proposal according to procedures required by NFS 1872.403-1(e). The categories are defined as:
  - Category I. Well conceived and scientifically and technically sound 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 data that 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 (continued)

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- Category II. Well conceived and scientifically or technically sound investigations which are recommended for acceptance, but at a lower priority than Category I.
- Category III. Scientifically or technically sound investigations, which require further development. Category III investigations may be funded for development and may be reconsidered at a later time for the same or other opportunities.
- Category IV. Proposed investigations which are recommended for rejection for the particular opportunity under consideration, whatever the reason.



## Evaluation Process Conclusion

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- Once Categorization has been completed, the Evaluation is considered complete unless questioned by a subsequent 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.





# Approval

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Cindy L. Daniels  
Director, Science Office for  
Mission Assessments, SOMA

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Dr. Marc Allen  
SMD Deputy Associate Administrator for  
Research, Acting

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# 2016 Heliophysics Explorer Mission of Opportunity (MO)

## Program Element Appendix (PEA) Q

### Evaluation Plan

June 28, 2016



# Introduction

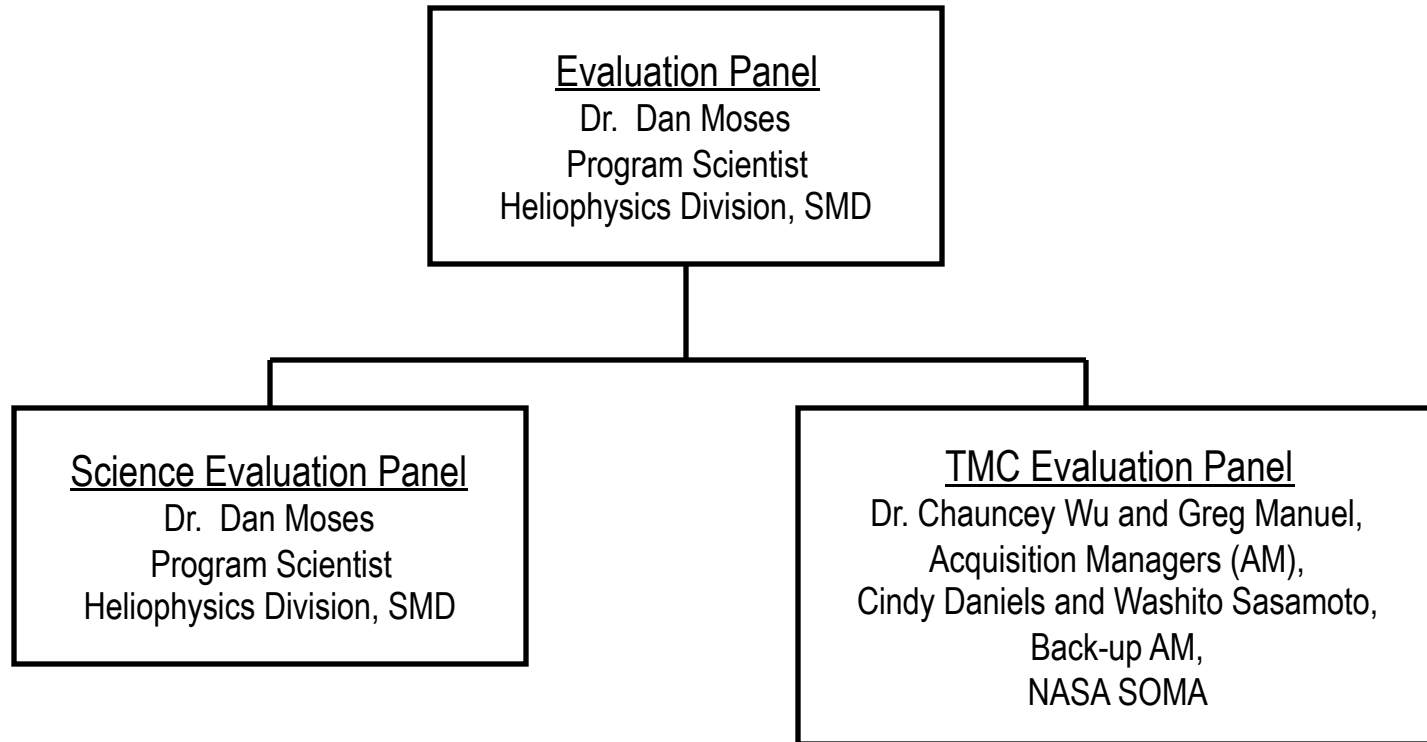
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- The 2016 Heliophysics Explorer Mission of Opportunity (MO) PEA Q Evaluation Plan covers evaluation information directly from the PEA Q and from the evaluation processes conducted by the Science Panel and Technical Management and Cost (TMC) Panels.
- The PEA Q solicits only science investigations, so wherever the phrase “Science, Exploration, or Technology” appears in the SALMON-2 evaluation plan, it should be interpreted to be only “Science”.
- The SALMON-2 Evaluation Plan is a companion document.
- “**PEA Q**” in the bottom left hand corner indicates that the page belongs to the PEA Q Evaluation Plan.



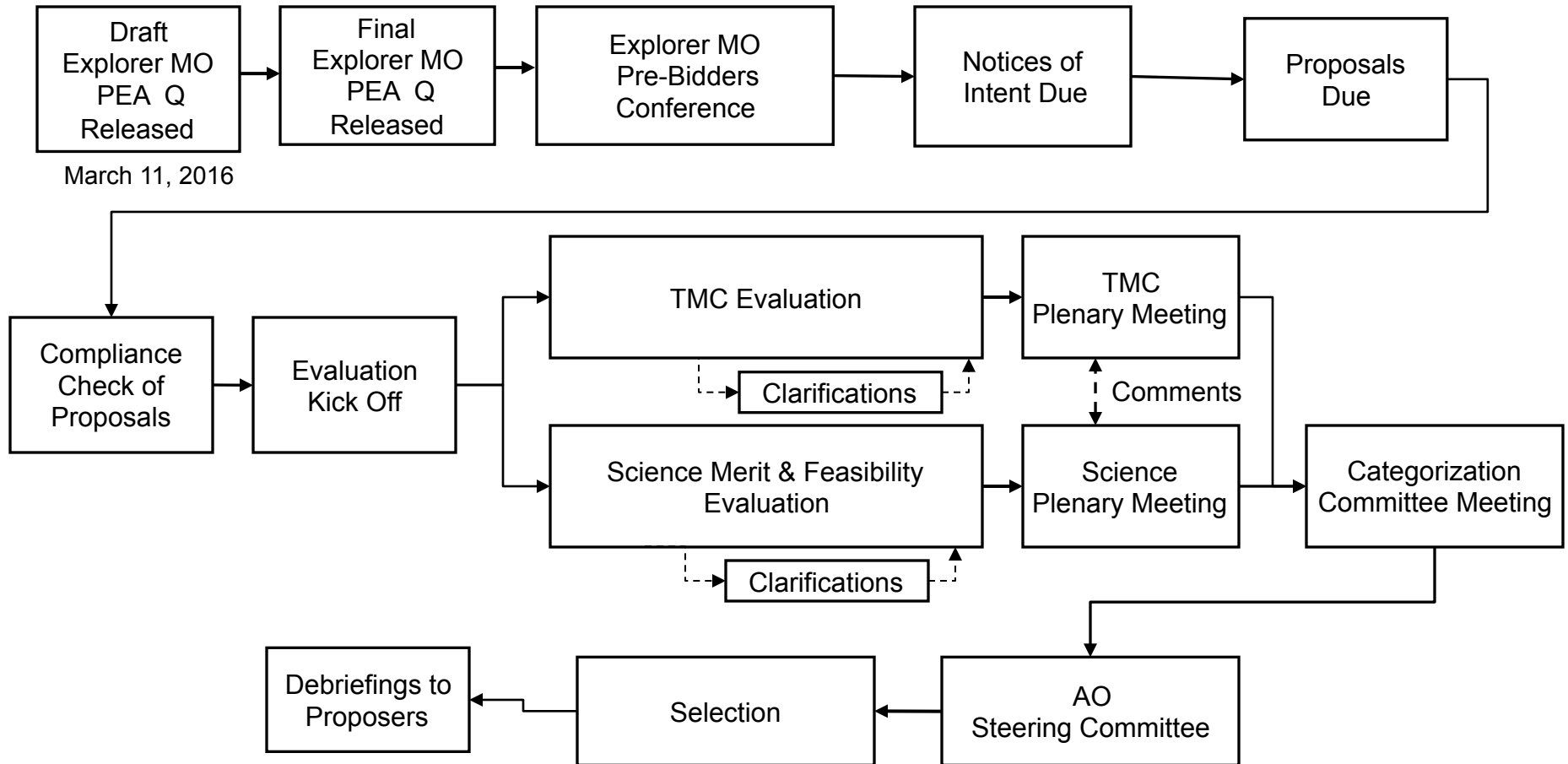
# Evaluation Panel Organization

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# Proposal Evaluation Flow





# Evaluation: Clarifications from Proposers

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NASA will request clarification of potential major weaknesses (PMWs) identified by the “Scientific Implementation Merit and Feasibility of the Proposed Investigation” and “TMC Feasibility of the Investigation Implementation, Including Cost Risk” evaluation panels.

- NASA will request such clarification uniformly, from all proposers.
- 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.
- PIs whose proposals have no (PMWs) will receive an email informing them.
- 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 PMW is addressed.
  - Noting that the PMW is not addressed in the proposal.
  - Stating that the PMW is invalidated by information that is common knowledge and is therefore not included in the proposal.
  - Stating that the analysis leading to this PMW 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 PMWs clarification. Any response that goes beyond a clarification will be deleted and will not be shown to the evaluation panel.



# 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 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*.
- Minimum cost threat threshold is set at \$1M.

		Cost Impact (CI, % of PI-Managed Investigation cost to complete Phases A/B/C/D not including unencumbered cost reserves)				
		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.



# Scientific/Technical Evaluation Factors

## Step 1 of a 2-Step Process

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From Section 6.1:

- Proposals will be evaluated according to the evaluation criteria set forth in Section 7.2 of the SALMON-2 AO.
- In addition to the evaluation factors given in Section 7.2.3 of the SALMON-2 AO, the evaluation of the Experiment Science Implementation Merit and Feasibility of the Investigation also includes the following additions to Factors B-2 and B-3:
  - Factor B-2, probability of technical success, also includes the maturity and technical readiness of the instruments or demonstration of a clear path to achieve necessary maturity.
  - Factor B-3, Merit of the data analysis, data availability, and data archiving plan. This factor includes the merit of plans for data analysis and data archiving to meet the goals and objectives of the investigation.
- In addition to the evaluation criteria given in Section 7.2.4 of the SALMON-2 AO, the evaluation of the *TMC Feasibility of the Investigation Implementation, including Cost Risk* also includes the following additions to Factors C-1 and C-3:
  - Factor C-1, an assessment of plans for the development and use of new instrument technology, plans for advanced engineering developments, and the adequacy of backup plans to mature systems within the proposed cost and schedule when systems having a TRL less than 6 are proposed.
  - Factor C-3, plans for the development and use of new technology, plans for advanced engineering developments, and the adequacy of backup plans to ensure success of the mission when systems having a TRL less than 6 are proposed.





# Student Collaboration

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- From Section 4.7 – SALMON-2 Required Specifications for PEAs - affirms that proposals may define a Student Collaboration (SC) that is a separate part of the proposed investigation and that Requirements 71 and 72 of the SALMON-2 AO, section 5.7.2, apply to PEA P.
  - Per the SALMON-2 AO section 7.2.3, Student Collaboration proposals, if any, will be evaluated only for the impact they have on experimentation implementation feasibility to the extent that they are not separable; student collaboration proposals will not be penalized for any inherent higher cost, schedule, or technical risk, as long as the student collaboration is shown to be clearly separable from the implementation of the Baseline Investigation. The intrinsic merit of student collaborations will not be evaluated at this time.
  - Per the SALMON-2 AO section 7.2.4, Student Collaboration proposals, if any, will be evaluated only for the impact they have on TMC feasibility to the extent that they are not separable; student collaboration proposals will not be penalized for any inherent higher cost, schedule, or technical risk, as long as the student collaboration is shown to be clearly separable from the implementation of the Baseline Investigation. The intrinsic merit of student collaborations will not be evaluated at this time.
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# Selection Factors

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From Section 6.2:

- As stated in Section 7.3 of the SALMON-2 AO, the Selection Official may take into account a wide range of programmatic factors in deciding whether or not to select any proposals and in selecting among selectable 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).



# Approval

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Heliophysics Division, SMD

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