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Announcement of Opportunity  
NNH19ZDA0100  
Discovery 2019  
Evaluation Plan

Cleared for Public Release  
June 28, 2019



# Outline

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# Introduction



# Introduction

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## Purpose of this Evaluation Plan

The Discovery 2019 Evaluation Plan covers evaluation information directly from the Announcement of Opportunity (AO) and evaluation processes utilized by the Science Panel and the Technical, Management, and Cost (TMC) Panel.



# Introduction

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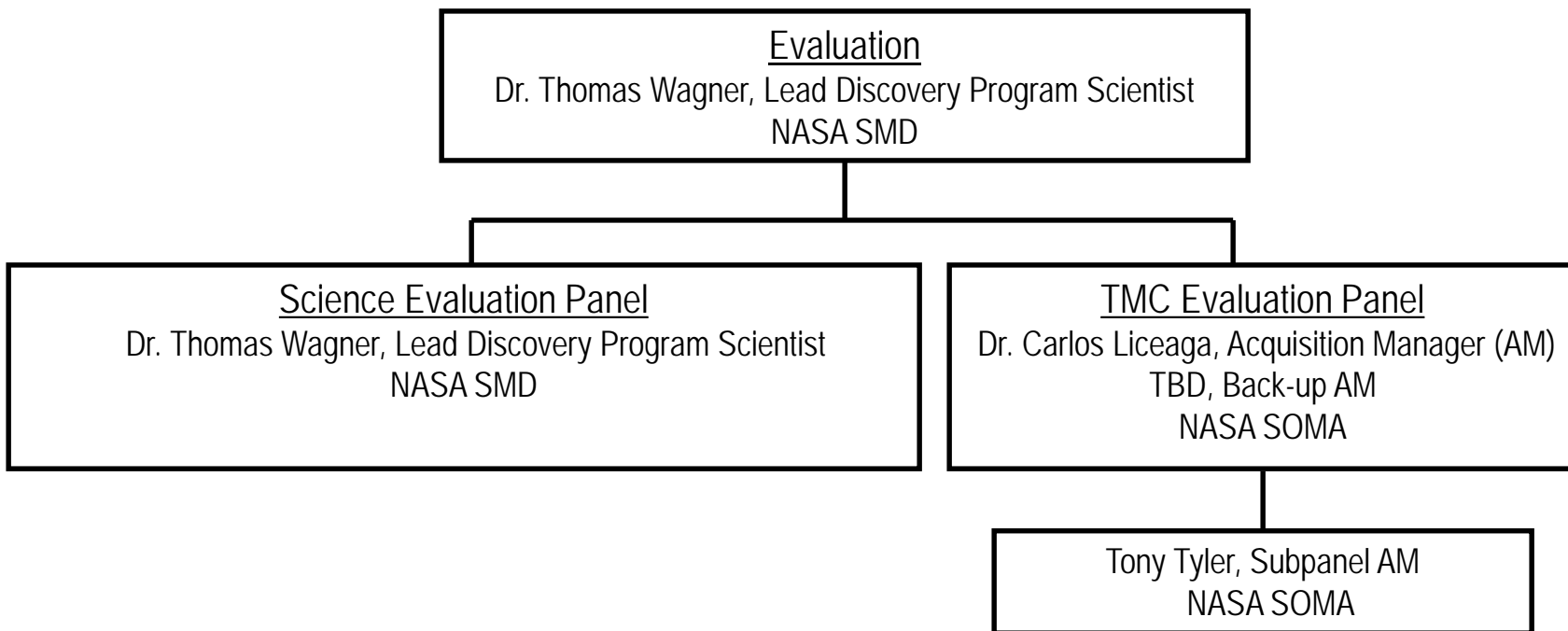
## Discovery 2019 Solicitation

- All investigations proposed in response to this solicitation must support the goals and objectives of the Discovery Program, must be implemented by Principal Investigator (PI) led investigation teams, and must be implemented through the provision of complete spaceflight missions.
- The Phase A through D portions of the PI Managed Mission Cost, excluding the cost of launch vehicles, is capped at \$500M FY 2019 dollars. Development of ground or flight system software and the development, fabrication, or refurbishment of test-beds taking place in Phase E will be considered deferred Phase D work and falls under the AO Cost Cap.
- This Evaluation Plan covers step one of a two-step competitive process.



# Introduction

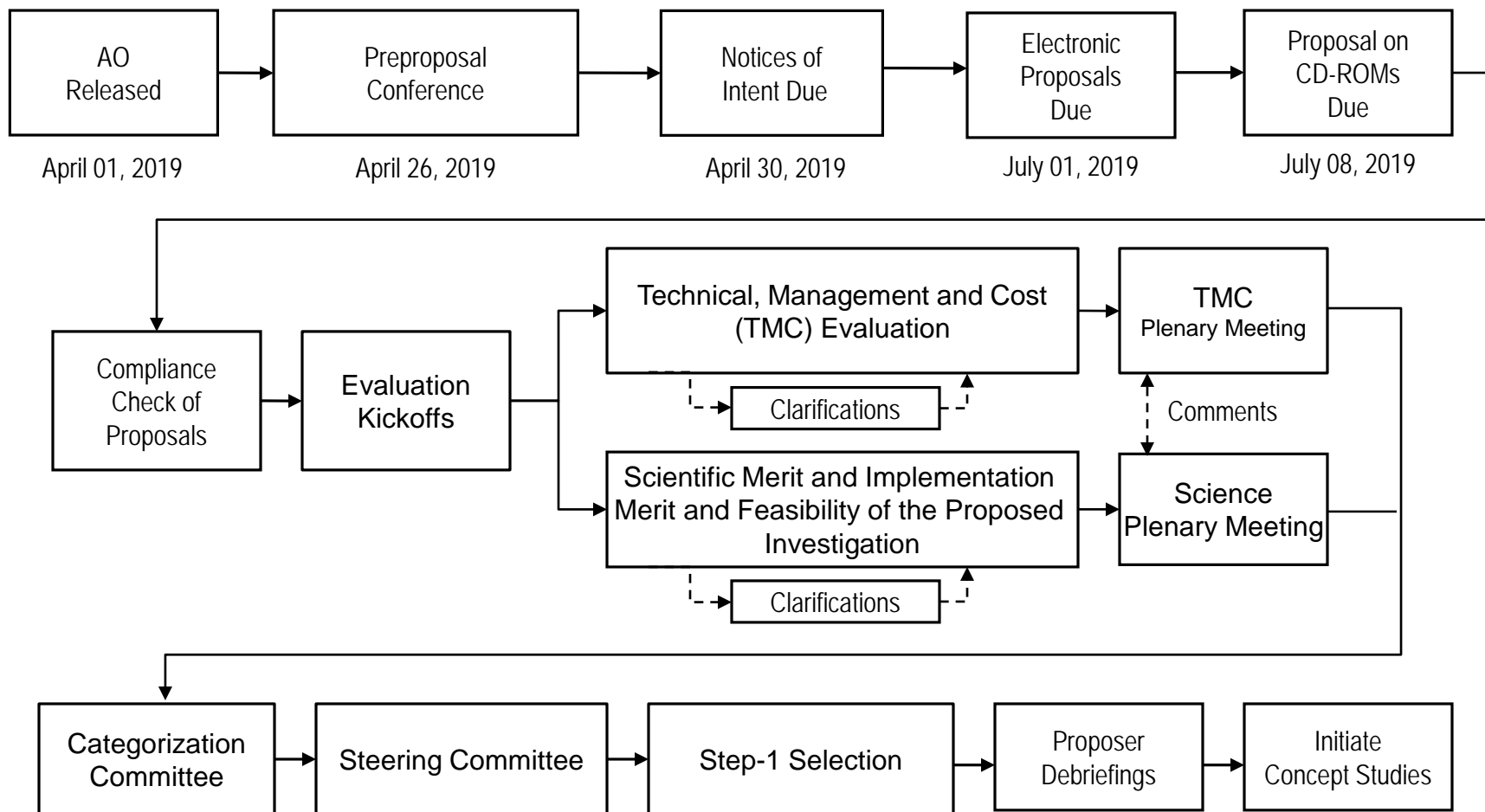
## Evaluation Organization





# Introduction

## Step-1 Proposal Evaluation Flow





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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 and Risk are to be assessed on the basis of the material in the proposal and the clarification process.
- Ratings shall 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

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- All proposals will be evaluated to uniform standards established in the Discovery 2019 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 Evaluators (to provide special science expertise to the Science Panel) may be utilized, respectively, based on need for expertise in a specific technology or science that is proposed.



# Conflicts of Interest (COI) Prevention Requirements

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- Cornell Technical Services (CTS) will cross-check all contracted Science and TMC Panel members against the lists of personnel and organizations identified in each proposal submitted to determine whether any organizational Conflict of Interest (COI) exists.
- Additionally, all contracted 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 and IPA evaluators will self-certify their COI status by reviewing a combined listing of individuals and organizations associated with the proposals.
- The Science evaluators must notify the Discovery Lead Program Scientist, Dr. Thomas Wagner, in case of a potential conflict that arises during the evaluation. The TMC evaluators must notify the Acquisition Manager, Dr. Carlos Liceaga, in case of a potential conflict that arises during the evaluation.



# 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 Lead Discovery 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 appendices to the COI Mitigation Plan.
- If any previously unknown potential conflict of interest arises during the evaluation, the conflicted member(s) must 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 Lead Discovery 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 non Civil Servant (CS) or non Intergovernmental Personnel Act (IPA) Assignee evaluator will sign a NASA Non-Disclosure Agreement (NDA) that must be on file at NASA Research and Education Support Services (NRESS) prior to any proposals being distributed to that evaluator.
  - CS and IPA evaluators are under statutory obligations.
- The proposal materials that each evaluator has access to is documented.
- 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 controlled NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES), *via* the controlled Remote Evaluation System (RES), *via* controlled WebEx, *via* NASA's Large File Transfer capability, or *via* encrypted email, parcel post, fax, or regular mail.
- Teleconferences among Panel evaluators will be conducted *via* controlled 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 NASA Science Office for Mission Assessments (SOMA) vault.



# Investigation Evaluation Criteria

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- Evaluation Criteria from the Discovery 2019 AO:
  - Scientific Merit of the Proposed Investigation (Section 7.2.2)
  - Scientific Implementation Merit and Feasibility of the Proposed Investigation (Section 7.2.3); and
  - Technical, Management, and Cost (TMC) Feasibility of the Proposed Mission Implementation (Section 7.2.4).
- Weighting: the first (A) criterion is weighted approximately 40%; the second (B) and third (C) criteria are weighted approximately 30% each.



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# Discovery 2019 AO Appendix F: Compliance Checklist



# Compliance Criteria

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## Administrative:

1. Electronic proposal received on time
2. Proposal on CD-ROM received on time
3. Original signature of authorizing official included
4. Meets page limits
5. Meets general requirements for format and completeness (one volume original easy to disassemble, maximum 55 lines text/page, maximum 15 characters/inch -- approximately 12 pt font)
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. Restrictions Involving China acknowledged on Electronic Cover Page

## Scientific:

11. Addresses solicited science research programs
12. Requirements traceable from science to instruments to mission





# Compliance Criteria

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## Scientific (continued):

13. Appropriate data archiving plan
14. Baseline science mission and threshold science mission defined

## Technical:

15. Complete spaceflight mission (Phases A-F) proposed
  16. Team led by a single PI
  17. Phase A-D portion of PI-Managed Mission Cost within AO Cost Cap or Adjusted AO Cost Cap, as applicable
  18. Phase A costs within Phase A cost limit
  19. Contributions within contribution limits
  20. Co-investigator costs in budget
  21. Launch readiness prior to launch readiness date
  22. Includes table describing non-U.S. participation
  23. Includes letters of commitment from funding agencies for non-U.S. participating institutions
  24. Includes letters of commitment from all U.S. organizations offering contributions
  25. Includes letters of commitment from all major partners and non-U.S. institutions providing contribution of efforts of anyone on the Proposal Team.
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# Science Evaluation



# Typical Science Panel Composition and Organization

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- The Lead Discovery Program Scientist leads the Science Panel
- Science Panel evaluators are typically, but not exclusively, recruited from the academic, governmental, and industrial research communities.
- The approach to reviewer identification will be reviewed by an SMD Steering Committee convened by the DAAR.
- The Science Panel evaluates Scientific Merit of the Proposed Investigation (7.2.2) and Scientific Implementation Merit and Feasibility of the Proposed Investigation (7.2.3).
- The science evaluation will be conducted via a single Science Panel, and 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 evaluated by assigned Panel members.
  - The Lead Evaluator for each proposal will lead the discussion.
  - At the request of the Lead Evaluator, a Supporting Evaluator will take notes on the discussion.
- The TMC Panel may provide comments and questions to the Science Panel.
- The Science Panel will request Science Merit (Form A) and Science Implementation Merit and Investigation Feasibility (Form B) clarifications from proposers on Potential Major Weaknesses (PMWs) identified during the evaluation process.



# Science Panel Procedures

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- Each member of the Panel will evaluate 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 will evaluate only those parts of proposals pertinent to their scientific or technology specialties.
- Each proposal will be discussed by the evaluators in teleconferences.
  - Findings in the form of Strengths and Weaknesses will provide the basis for initial panel discussions.
  - Each Evaluator will provide an individual evaluation prior to teleconferences.
  - The proposal and the evaluations by the individual evaluators, including non-panel evaluators, will be discussed during teleconferences.
  - Following teleconferences, the Lead Evaluator captures/synthesizes individual evaluations, including discussion, and will generate the Draft Evaluation including draft findings.
  - The draft findings will include PMWs to be sent to the proposers for clarification.
  - There is no overall merit grade assigned prior to receiving the responses to the PMWs clarification requests.



# Science Panel Procedures

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- A Science Evaluation Plenary 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 Evaluator will lead the discussion, summarize the proposed investigation, and document the results.
  - The PMWs 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 Evaluators synthesize and document Panel evaluations.



# Typical Science Panel Products

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- For each proposal, the process results in:
  - Form A
    - Proposal title, PI name, and submitting organization;
    - Proposal summary;
    - Based on findings, an adjectival median rating for Scientific Merit Feasibility of the Proposed Investigation, ranging from “Excellent” to “Poor”;
    - Polling distribution for each median rating\*;
    - Summary rationale for the median rating;
    - Narrative findings, identified as major or minor strengths or weaknesses;
    - Comments to PI, comments to NASA\*, and comments to the TMC Panel\*. (optional)
  - Form B
    - Proposal title, PI name, and submitting organization;
    - Based on findings, an adjectival median rating for Scientific Implementation Merit and Feasibility of the Proposed Investigation, ranging from “Excellent” to “Poor”;
    - Polling distribution for each median rating\*;
    - Summary rationale for the median rating;
    - Narrative findings, identified as major or minor strengths or weaknesses;
    - Comments to PI, comments to NASA\*, and comments to the TMC Panel\*. (optional)

\* Note: not provided to proposers



# Science Evaluation Criterion A

## Factors

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### Criterion A: Scientific Merit of the Proposed Investigation

- Factors from Discovery 2019 Section 7.2.2
  - Factor A-1. Compelling nature and scientific priority of the proposed investigation's science goals and objectives.
  - Factor A-2. Programmatic value of the proposed investigation.
  - Factor A-3. Scientific value of the Threshold Science Mission.



# Science Evaluation: Factor A-1

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Compelling nature and scientific priority of the proposed investigation's science 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 scientific impact of the investigation on program, Agency, and national science objectives; and the potential for fundamental progress, as well as filling gaps in our knowledge relative to the current state of the art.





# Science 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 scientific progress in the context of other ongoing and planned missions; the relationship to the other elements of NASA's science 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 Evaluation: Factor A-3

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Scientific value of the Threshold Science Mission. This factor includes the scientific value of the Threshold Science Mission using the standards in the first factor of this section and whether that value is sufficient to justify the proposed cost of the mission.

Note: Factors A 1 through A 2 are evaluated for the Baseline Science Mission assuming it is implemented as proposed and achieves technical success. Factor A 3 is similarly evaluated for the Threshold Science Mission.



# Science Evaluation Criterion B

## Factors

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### Criterion B: Scientific Implementation Merit and Feasibility of the Proposed Investigation

- Factors from Discovery 2019 AO Section 7.2.3
  - Factor B-1. Merit of the scientific implementation in supporting the scientific goals and objectives.
  - Factor B-2. Probability of technical success.
  - Factor B-3. Data adequacy, sufficiency, analysis, and archiving.
  - Factor B-4. Science resiliency.
  - Factor B-5. Probability of science team success.



# Science Evaluation: Factor B-1

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Merit of the scientific implementation in supporting the scientific goals and objectives. This factor includes the appropriateness of the proposed mission architecture, instruments, and measurement techniques for addressing the goals and objectives; how well the anticipated measurements support the goals and objectives; and the appropriateness of the mission requirements for guiding development and ensuring scientific success.



## Science Evaluation: Factor B-2

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Probability of technical success. This factor includes the maturity and technical readiness of the instruments or demonstration of a clear path to achieve necessary maturity; 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 mission design.



## Science Evaluation: Factor B-3

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Data adequacy, sufficiency, analysis, and archiving. This factor includes the degree to which the proposed mission and instruments can provide the necessary data, particularly the adequacy of the quality and quantity of data provided by the investigation to complete the investigation and meet the proposed science goals and objectives and result in the publication of science discoveries in the professional literature. Additionally, this factor includes the merit of plans for data analysis, data archiving, cartography, and/or sample analysis and curation to meet the goals and objectives of the investigation and to preserve data and analysis samples of value to the science community. Considerations in the assessment of each of these plans include adequate resources (e.g., budget, schedule, equipment) and the timely execution of the plans, especially for release to the public domain of data usable to the entire science community (and associated high-level data products and software) and/or samples for enlarging the science impact.



## Science Evaluation: Factor B-4

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Science resiliency. This factor includes both developmental and operational resiliency. Developmental resiliency includes the approach to descoping the Baseline Science Mission to the Threshold Science Mission 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 Evaluation: Factor B-5

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Probability of science team success. This factor will be evaluated by assessing the experience, expertise, and organizational structure of the science team and the mission 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. The inclusion of career development opportunities to train the next generation science leaders will also be evaluated.





# Science Evaluation Products: Findings

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- **Major Strength:** An aspect of the proposal 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:** An aspect of the proposal that is judged to contribute to the ability of the project to meet its scientific objectives.
- **Minor Weakness:** A deficiency or set of deficiencies taken together that are judged to weaken the project's ability to meet its scientific objectives.

\* Note: Findings that are considered "as expected" are documented as "No findings" in the Forms A or B.



# Form A and B Grade Definitions

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- **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 weaknesses 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 adjectival rating.

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# Technical, Management, and Cost (TMC) Evaluation



# 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 (LaRC), leads the TMC panel.
  - NASA SOMA works directly for NASA Headquarters and is firewalled from the rest of NASA LaRC.
- TMC Evaluators are a mix of non-conflicted contractors, consultants, Civil Servants, and IPAs 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 contribute only to findings; they do not provide ratings.



# TMC Panel Evaluation Factors

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

- Factors from Discovery 2019 AO Section 7.2.4
  - Factor C-1. Adequacy and robustness of the instrument implementation plan.
  - Factor C-2. Adequacy and robustness of the mission design and plan for mission operations.
  - Factor C-3. Adequacy and robustness of the flight systems.
  - Factor C-4. Adequacy and robustness of the management approach and schedule, including the capability of the management team.
  - Factor C-5. Adequacy and robustness of the cost plan, including cost feasibility and cost risk.



# TMC Evaluation 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 mission 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 advanced engineering developments as well as the adequacy of backup plans to mature systems within the proposed cost and schedule when systems having a TRL less than 6 are proposed.



# TMC Evaluation Factor C-2

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Adequacy and robustness of the mission design and plan for mission operations. This factor includes an assessment of the overall mission design and mission architecture, the spacecraft design and design margins (including margins for launch mass, delta-V, and propellant), the concept for mission operations (including communication, navigation/tracking/trajjectory analysis, and ground systems and facilities), and the plans for launch services. This factor includes mission 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 Science Mission.

When appropriate, Factor C-2 will include an assessment of proposed planetary protection provisions to avoid potential biological contamination (forward and backward) that may be associated with the mission. An evaluation of the implementation of these provisions in the preparation or processing of proposed instruments, the development of the flight system, in project management, and to proposed costs will be included in the evaluations of Factors C-1, C-3, C-4, and C-5, as appropriate.



# TMC 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, 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. The maturity and technical readiness of the spacecraft, subsystems, and operations systems 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.





# TMC 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, mission management team, and known partners; the commitment, spaceflight experience, relevant performance of the PI, PM, other named Key Management Team members, and implementing organization, mission management team, and known partners against the needs of the investigation; the prior working relationships of the implementing organization and known partners; the commitments of partners and contributors; and the team's understanding of the scope of work covering all elements of the mission, including contributions. 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 mission capabilities will be assessed against the potential science impact to the proposed Baseline Science Mission. 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 technical adequacy of contingency plans, where they exist, for coping with the failure of a proposed cooperative arrangement or contribution. This factor also includes assessment of 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 meeting the proposed launch readiness date. Also evaluated under this factor are the proposed project and schedule management tools to be used on the project. The inclusion of career development opportunities to train the next generation engineering and management leaders will also be evaluated.



# TMC Evaluation Factor C-5

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Adequacy and robustness of the cost plan, including cost feasibility and cost risk. This factor includes 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 mission). The adequacy of the cost reserves and understanding of the cost risks will be assessed. This factor also includes an assessment of the proposed cost relative to estimates generated by the evaluation team 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;
- Based on findings, an adjectival median risk rating for TMC Feasibility of the Proposed Mission Implementation, Including Cost Risk, of "LOW Risk", "MEDIUM Risk", or "HIGH Risk";
- Polling distribution for each median risk rating\*;
- Summary rationale for the median risk rating;
- Narrative findings, identified as major or minor strengths or weaknesses;
- Comments to the proposer, comments to NASA\*

\* Note: not provided to proposers



# TMC Evaluation Products: 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 requirements 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 Products: Risk Ratings

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

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 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 Evaluation Principles

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- Basic Principles:
  - It is assumed that the proposer is the expert on his/her proposal.
  - Proposer's task is to demonstrate that the investigation implementation risk is LOW.
  - TMC Panel's task is to try to validate proposer's assertion of LOW risk.
- Risk is to be assessed on the basis of material in the proposal and the clarification process. All Proposals are evaluated to identical standards and not compared to other proposals.
- The Cost Risk is integrated into the overall TMC risk rating and will not have a separate adjectival rating.
- Proposals are based on Pre-Phase-A concepts; TMC Risk Assessments give appropriate benefit of the doubt to the Proposer.



# Clarifications

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NASA will request clarification of potential major weaknesses and significant cost findings (statements that the proposer's estimate for a WBS element could not be validated) identified during the evaluations of Scientific Merit, Scientific Implementation Merit and Feasibility, and TMC Feasibility of the Proposed Mission Implementation, Including Cost Risk.

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

The PI will be given at least 48 hours to respond to the request for clarification. Any response that does not correspond to any of the options above, or does not conform to guidelines provided with the the request, will be redacted or deleted, and will not be shown to the evaluation panel.



# TMC Cost Analysis

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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.).
- 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 # 49). The remaining unencumbered reserves are compared to the minimum required in the AO.
- 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.





# TMC Cost Threat Matrix

- The *likelihood* and *cost impact*, if any, of each weakness is stated as “This finding represents a cost threat assessed to have a Unlikely/Possible/Likely/Very Likely/Almost Certain likelihood of a 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 realized threat.
- The cost threat matrix below defines the adjectives used to describe the *likelihood* and *cost impact*.
- The minimum cost threat threshold is \$1M.

		Cost Impact (CI)					
		% of PI-Managed Mission Cost (PIMMC) to complete Phases A/B/C/D or Phase E not including unencumbered cost reserves or contributions					
Likelihood of Occurrence		Very Minimal	Minimal	Limited	Moderate	Significant	Very Significant
		0.25% < CI ≤ 2.5% (\$0M < CI ≤ \$0M)	2.5% < CI ≤ 5% (\$0M < CI ≤ \$0M)	5% < CI ≤ 10% (\$0M < CI ≤ \$0M)	10% < CI ≤ 15% (\$0M < CI ≤ \$0M)	15% < CI ≤ 20% (\$0M < CI ≤ \$0M)	CI > 20% (CI > \$0M)
		1% < CI ≤ 2.5% (\$0M < CI ≤ \$0M)	2.5% < CI ≤ 5% (\$0M < CI ≤ \$0M)	5% < CI ≤ 10% (\$0M < CI ≤ \$0M)	10% < CI ≤ 15% (\$0M < CI ≤ \$0M)	15% < CI ≤ 20% (\$0M < CI ≤ \$0M)	CI > 20% (CI > \$0M)
Likelihood (L, %)	Almost Certain (L > 80%)						
	Very Likely (60% < L ≤ 80%)						
	Likely (40% < L ≤ 60%)						
	Possible (20% < L ≤ 40%)						
	Unlikely (L ≤ 20%)						

Note: Each instance of “\$0M” in the table above is converted to dollars according to the associated percentage, on a proposal-by-proposal basis. Depending on proposed PI-Managed Mission Cost, some columns may not apply



# Classified Proposal Appendix Regarding Heritage

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Per Section 5.8.4 of the Discovery 2019 AO

- Should a proposer choose to deliver a classified appendix regarding heritage to NASA in addition to a complete proposal, the evaluation process (see Section 7.1.1) will be supplemented. At least one NASA-selected evaluator with appropriate clearance and relevant expertise will review the classified appendix regarding heritage; this evaluator may be a member of the evaluation panel or this evaluator may be a specialist reviewer. All findings generated during the review of the classified appendix regarding heritage will be unclassified, and these findings will be provided as input for assessing the Technical, Management, and Cost (TMC) Feasibility of the Proposed Mission Implementation. Clarifications may be requested concerning findings from evaluation of the classified appendix regarding heritage.
- The entire proposal including the unclassified appendix regarding heritage will be read and evaluated by the entire evaluation panel. The evaluation panel will not have access to the classified appendix regarding heritage, however. Proposers are strongly encouraged to provide as much information and detail as possible on their technology heritage in the unclassified appendix regarding heritage.

Evaluators of the classified appendix regarding heritage will address questions from other members of the evaluation panel, subject to the constraints of classification.



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# Categorization



## Categorization – Section 7.1.2

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Subsequent to the evaluation process, NASA will convene a 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 for the Science Mission Directorate.

The Categorization Committee will consider the Scientific Merit, Scientific Implementation Merit and Feasibility, and TMC Feasibility of the Proposed Mission Implementation and, based on the evaluations, categorize the proposals in accordance with procedures required by NFS 1872.404. The categories are defined in NFS 1872.404(k) as follows:

- 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 – Section 7.1.2

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- 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 which are recommended for rejection for the particular opportunity under consideration, whatever the reason.



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# Steering and Selection



## Steering Committee – Section 7.1.2

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SMD AO Steering Committee will review the results of the evaluations and categorizations. The 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 Process – Section 7.1.3

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- Selection Official: Associate Administrator for the Science Mission Directorate.
- The SMD Associate Administrator may consult with senior members of SMD and the Agency concerning the selections.
- As part of the selection decision, a decision will be made as to whether or not any Category III proposals will receive funding for technology development.
- The results of the proposal evaluations based on the criteria and the categorizations will be considered in the selection process. Additional selection factors are described in section 7.3.





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# Observers



# Observers

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Under special circumstances, Civil Servants, IPAs, and/or contractors with downstream implementation responsibilities may be invited to participate as observers to panel meetings.

- Observer participation must be approved by the Program Scientist and the Deputy Associate Administrator for Research.
- Observers must comply with SMD Policy Document SPD-17, *Statement of Policy on Observers at Panel Reviews of Proposals*. This policy will be provided to all approved observers who have implementation responsibilities.



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# Approval



# Approval

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Dr. Carlos Liceaga  
Acquisition Manager, SOMA

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Dr. Thomas Wagner  
Lead Discovery Program Scientist, Planetary  
Science Division, Science Mission  
Directorate

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Dr. Cindy Daniels  
Director, Science Office for Mission  
Assessments (SOMA)

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Dr. Lori Glaze  
Director, Planetary Science Division, Science  
Mission Directorate

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Dr. Michael New  
SMD Deputy Associate Administrator for  
Research

\* Signed copy on file