



# Discovery 2019 Announcement of Opportunity Preproposal Conference

## Technical, Management, and Cost Evaluation Overview

### April 26, 2019

Washito Sasamoto  
Discovery Acquisition Manager  
NASA Science Office for Mission Assessments

---



# Outline

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

---

Notable Sections and Requirements

Technical, Management, and Cost Evaluation

References

Questions



# Notable Sections and Requirements



## Notable DRAFT AO Q&As (1 of 2)

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

Requirement 44 states “proposals shall address conformance to the applicable maximum channel bandwidth limit(s).” Please confirm that the applicable maximum channel bandwidth limit(s) are as stated in SFCG Recommendation 23-1. Please also confirm that demonstrating conformance with SFCG Recommendation 23-1 for X-band science data downlink meets this requirement.

***NASA Response: There are different rules for different space research service (SRS) bands. SFCG Rec. 23-1 limits the X-band (8400-8450 MHz) bandwidth used by deep space missions. The limit depends on type of mission (Mars or non-Mars) and the mission’s data rate. So, each deep space mission should comply with this recommendation and be able to show that it complies. For SRS X-band near-Earth (8450-8500 MHz) the SFCG Rec. 5-1 limits the bandwidth to 10 MHz. For the SRS S-band (2200-2290 MHz) missions the NTIA bandwidth limit is 6 MHz. There is also a SFCG Rec. 27-1 bandwidth limit of 60 MHz on the deep space Ka-band (31.8-32.3 GHz). All NASA missions are required to comply with NTIA and SFCG recommendations. If [a proposer can] give us the telecom and orbital requirements of the specific mission he is concerned about, we can tell him if that mission complies with different spectrum rules.***

**Note: The AO-referenced *Available Spectrum and Channel Limits By Allocated Service* has been posted to the Program Library. It indicates that for 2200-2290 MHz the maximum channel bandwidth is 5 MHz.**



## Notable DRAFT AO Q&As (1 of 2)

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

---

How should changing exchange rates be handled in estimating the value of foreign contributions?

*NASA Response: The exchange rate to use is the official rate on the date of [final] AO release.*

The NASA New Start Inflation Index is similarly locked to the date of the final AO release. It has been posted to the Program Library and will not be updated.



# Notable Sections and Requirements

## Adjusted AO Cost Cap

---

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

### APPENDIX C / GLOSSARY OF TERMS AND ABBREVIATIONS

**Adjusted AO Cost Cap** — The value that the Phases A-D portion of a proposal's PI-Managed Mission Cost is limited to, after adjustment from the AO Cost Cap for proposal-specific incentives and/or charges associated with **NASA-provided items that have firm fixed values**. Expressed in applicable Fiscal Year Dollars.



# Notable Sections and Requirements

## Phase E-F Portion of PIMMC

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

### *7.4.4 Conduct of the Phase A Concept Study*

The PI will provide in the Phase A Concept Study Report a proposed set of Level 1 requirements, including the criteria for full mission success satisfying the Baseline Science Mission and the criteria for minimum mission success satisfying the Threshold Science Mission. The PI will also provide in the Phase A Concept Study Report the allocation of the proposed cost reserves among the appropriate WBS elements. The Phase A-D portion of the PI-Managed Mission Cost, including any Phase D work deferred until Phase E such as development, fabrication or refurbishment of test beds or the development of flight and ground software, will not increase by more than 20% from that in the Step-1 proposal to that in the Phase A Concept Study Report, and, in any case, will not exceed the AO Cost Cap or Adjusted AO Cost Cap, as applicable. **The Phase E-F portion of the PI-Managed Mission Cost will not increase by more than 20% from that in the Step-1 proposal to that in the Phase A Concept Study Report.** The NASA review of the completed Concept Study Report will include all mission facets. Risk reduction that has been accomplished during Phase A will be closely reviewed. NASA may request presentations and/or site visits to review the final concept study results with the investigators.



# Notable Sections and Requirements Science Payload Contributions

---

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

## Requirement 84

Foreign contributions to science instruments should not exceed **approximately one-third of the science payload**. Proposals shall include a discussion of the scale of the internationally-contributed instruments, how the proposed contribution is consistent with NASA's policy that the contribution does not exceed approximately one-third of the science payload, and how the programmatic risks associated with the contribution will be handled





# Notable Sections and Requirements

## NASA Concurrence on Change(s)

---

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

### *4.2.5 NASA Concurrence for **Change(s)** of Named Key Management Team Members **or Co-Is***

**Subsequent to selection, any replacement, addition, or removal** of a named Key Management Team member (including, but not limited to, the PI, Project Manager (PM), and Project Systems Engineer (PSE), **Deputy PI[~~r~~]** or any **Co-I[~~r~~]** requires concurrence by NASA.



# Notable Sections and Requirements

## Science Team

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

---

### Requirement B-24 [from Discovery 2014 AO]

This section shall identify each key member (i.e., one whose participation is essential to the success of the investigation) of the science team and his/her role and responsibilities. Resumes or curriculum vitae of science team members shall be included as appendices to the proposal (see Section J.3 of this appendix). The role of each Co-investigator (Co-I) shall be explicitly defined, the necessity of that role shall be justified, and the funding source (NASA or contributed) for the PI and each Co-I shall be noted. **Nonfunded members of the science team shall be identified in the proposal as collaborators (see Section 5.4 of this AO).** The role of collaborators may be defined and justified.

### Requirement B-25 [from Discovery 2019 AO]

This section shall identify each member of the science team and his/her role and responsibilities. Resumes or curriculum vitae of science team members shall be included as appendices to the proposal (see Section J.3 of this appendix). The role of the PI and each Co-investigator (Co-I) shall be explicitly defined, the necessity of that role shall be justified, and the funding source (NASA or contributor) shall be noted; the role of each collaborator shall be described and the funding source shall be noted.



# Notable Sections and Requirements

## Major Partners

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

---

### APPENDIX C / GLOSSARY OF TERMS AND ABBREVIATIONS

**Major partners** — The organizations, other than the proposing organization, responsible for providing science leadership, project management, system engineering, spacecraft (as applicable), science instruments, TDOs, integration and test, mission operations, and other critical or essential products or services as defined by the proposer; **all organizations, other than the proposing organization, receiving or contributing more than 10% of the PI-Managed Mission Cost are included, regardless of role.**



# Notable Sections and Requirements Classified Appendix Regarding Heritage

---

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

## *5.8.4 Classified Materials*

NASA allows three options for proposers to support heritage claims from classified programs: 1) delivery to NASA of a classified appendix regarding heritage, 2) "delivery in place" of a classified appendix regarding heritage, and subject to possible restriction 3) sponsor verification of the heritage claims derived from classified programs.



# TMC Evaluation



# TMC Evaluation

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

---

## Evaluation Criteria

Evaluation Criteria:

- Intrinsic Science or Exploration Technology Merit of the Proposed Investigation
- Experiment Science or Exploration Technology Merit and Feasibility of the Investigation
- **TMC Feasibility of the Investigation Implementation**

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

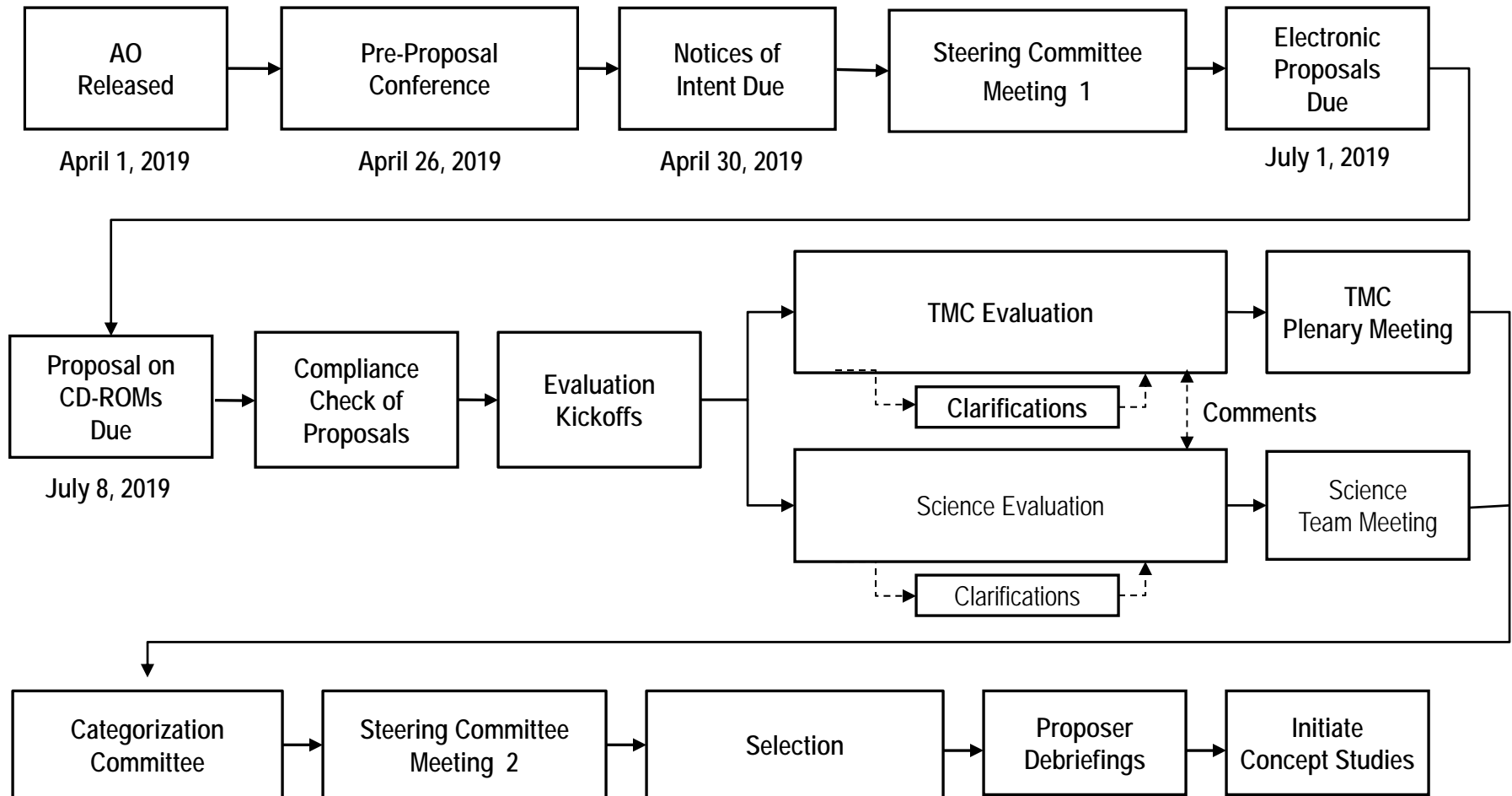
**TMC Evaluation:** The purpose of the TMC evaluation is to assess the **likelihood that the submitted investigations' technical and management approaches can be successfully implemented *as proposed*, including an assessment of the likelihood of their completion within the proposed cost and schedule.**



# TMC Evaluation

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

## AO Flow





# TMC Evaluation

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

---

## TMC Proposal Evaluation Factors:

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

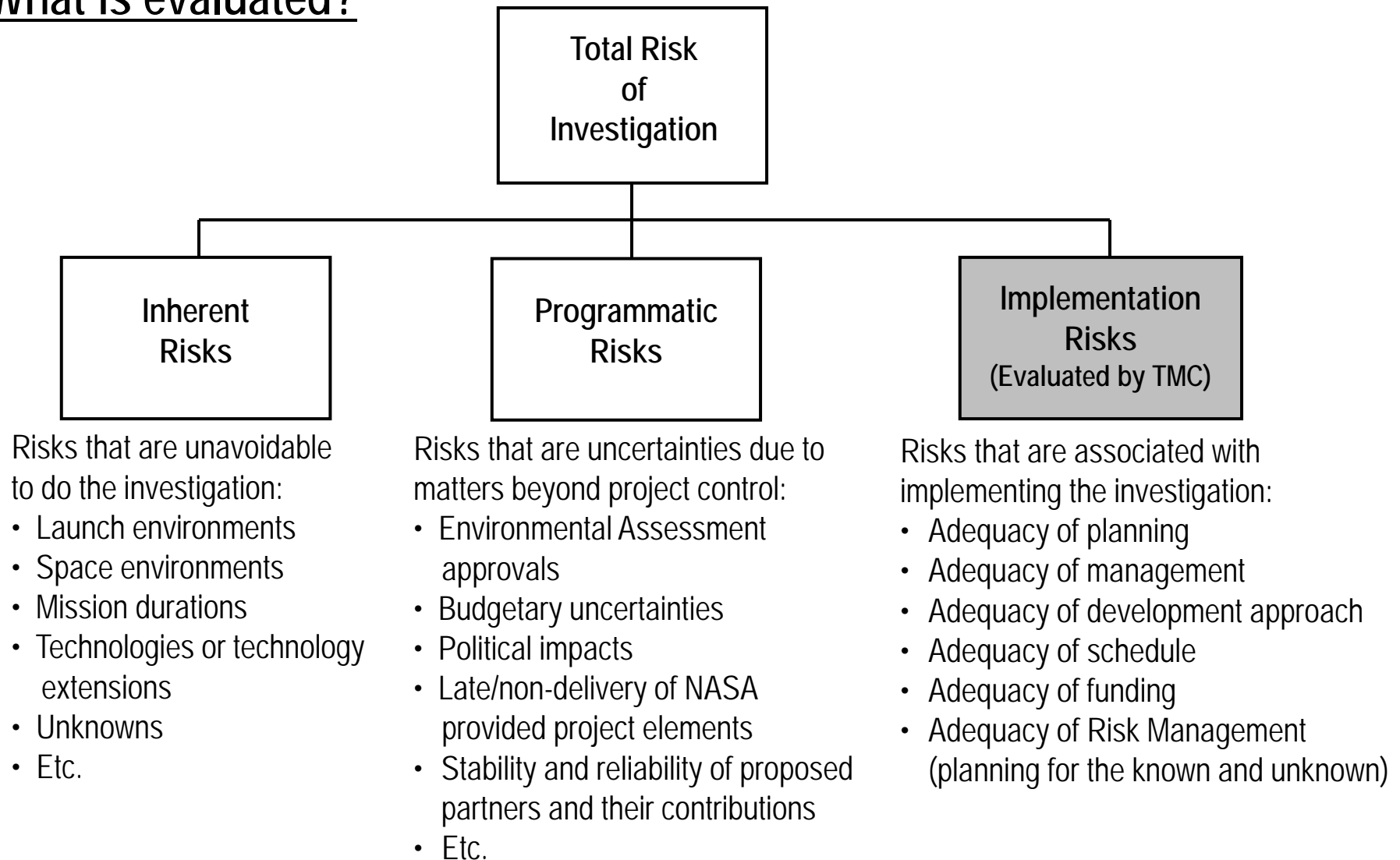




# TMC Evaluation

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

## What is evaluated?





# TMC Evaluation

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

---

## Evaluation Principles

- Basic Principles:
  - It is assumed that the proposer is the expert on his/her proposal.
  - Proposer's task is to *demonstrate* that the investigation implementation Low Risk.
  - TMC panel's task is to try to *validate* proposer's assertion of Low Risk.
- Risk is to be assessed on the basis of material in the proposal. All Proposals are evaluated to identical standards and not compared to other proposals.
- TMC Panels consist of evaluators who are experts in the factors that they evaluate.
- The Cost Analysis is integrated into the overall Risk Rating.
- Proposal Risk Assessment: Proposals are based on Pre-Phase-A concepts; TMC Risk Assessments give appropriate benefit of the doubt to the proposer.



# TMC Evaluation

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

---

## TMC Evaluation Findings

Major and minor strengths and weaknesses are defined as follows:

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

**Notes: TMC Risk Ratings for proposals only consider Major Strengths and Major Weaknesses.** Items that are considered "as expected" will not be documented as findings.



# TMC Evaluation

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

## TMC Evaluation Clarifications

NASA will request clarification of potential major weaknesses in the TMC Feasibility of the Investigation Implementation that have been identified by the TMC evaluation panel.

- NASA will request such clarification uniformly, from *all* proposers.
  - PIs whose proposals have no potential major weaknesses will receive an email informing them of the fact.
  - All requests for clarification from NASA, and the proposer's response, will be in writing.
- The ability of proposers to provide clarification to NASA is extremely limited, as NASA does not intend to enter into discussions with proposers. The form of the clarifications is strictly limited to a few types of responses:
  - Identification of the locations in the proposal (page(s), section(s), line(s)) where the potential major weakness is addressed
  - Noting that the potential major weakness is not addressed in the proposal.
  - Stating that the potential major weakness is invalidated by information that is common knowledge and is therefore not included in the proposal.
  - Stating that the analysis leading to the potential major weakness is incorrect and identifying a place in the proposal where data supporting a correct analysis may be found.
  - Stating that a typographical error appears in the proposal and that the correct data is available elsewhere inside or outside of the proposal.
- The Lead Discovery Program Scientist will provide detailed instructions after receipt of proposals.
- PIs will be given at least 24 hours to respond to the request for clarification. Any response that goes beyond a clarification will be deleted or redacted, and will not be shown to the evaluation panel.



# TMC Evaluation

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

---

## Cost Analysis

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



# TMC Evaluation

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

## 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.”
- 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.
- Unquantified cost threats may also be assessed.

		Cost Impact (CI) % of PI-Managed Mission Cost to complete Phases A/B/C/D or % of Phase E not including unencumbered cost reserves or contributions							
		Likelihood of Occurrence	Weakness	Very Minimal	Minimal	Limited	Moderate	Significant	Very Significant
				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)
				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 CSR-by-CSR basis. Depending on proposed PI-Managed Mission Cost, some columns may not apply.



# TMC Evaluation

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

---

## TMC Evaluation Risk Ratings Definitions

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

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



# TMC Evaluation

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

## TMC Evaluation Risk Ratings: Envelope Concept

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

**Low Risk:** Required resources fit well within available resources



**Medium Risk:** Required resources fit within available resources.



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







# References

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

---

## Discovery 2019 Program Library

It is incumbent upon the proposer to ensure that the documents used in proposal preparation are of the date and/or revision available in the Program Library (<http://discovery.larc.nasa.gov/dpl.html>).

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



# Questions

Discovery 2019 AO  
Pre-Proposal Conference  
Webex/Teleconference

---

## Questions

Any subsequent questions pertaining to the TMC Evaluation of Discovery 2014 AO proposals *must* be addressed to:

Dr. Tom Wagner

Discovery Program Lead Scientist

Planetary Science Division

Science Mission Directorate

National Aeronautics and Space Administration

Washington, DC 20546-0001

Telephone: 202-358-0390

Email: [thomas.wagner@nasa.gov](mailto:thomas.wagner@nasa.gov) (subject line to read "Discovery 2019 AO")