



**Heliophysics Explorers Program (HEP)  
2019 Medium-Class Explorer (MIDEX)  
Announcement of Opportunity (AO)  
Pre-Proposal Conference  
Technical, Management, and Cost (TMC)  
Evaluation Overview**

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# Outline

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**Notable Sections and Requirements**

**Technical, Management, and Cost Evaluation**

**References**

**Questions**



# Notable Sections and Requirements



**Q-19 Given that the payload Class C (per NPR 8705.4) designation for MIDEX investigations, if an investigation involves more than one observatory, **does each observatory need to be Class C?****

**No, the designation applies at the deployed investigation level.** This is in-line with the NPR 8705.4 allowance for lower Class designations for sub-elements:

Any equipment that constitutes a payload, or part of a payload, may be separately classified. For example, a Class A satellite may incorporate multiple instruments individually classified A through D.

Note that proposers of constellations are highly encouraged to provide reliability assessments **demonstrating the probability of meeting the mission lifetime requirements for both the Baseline and Threshold Science Missions.** Also, particular attention should be paid to the possibility of *system[ati]c* issues arising in the design of lower Class observatories.



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

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**Q-26 With regards to the deferred RY\$ requirements, do proposals need to reserve dollars under the AO Cost Cap or Adjusted AO Cost Cap—as applicable—to address escalation of FY\$ in Phase A concept studies?**

No. The AO Cost Cap and Adjusted AO Cost Cap are specified in terms of FY2019\$. It is understood that escalation of costs in Phase A concept studies may result in the PI-Managed Mission Cost—specified in terms of RY\$—exceeding the FY2019\$-based values in the AO. **Note that the version of the NASA New Start Inflation Index applicable to the final AO was released after the DRAFT AO was published.**



# Notable Sections and Requirements

## Launch Scenarios

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### 5.9.2.1 AO-Provided Primary Launch Services

Due to the volatility of the launch services market, NASA cannot ensure which launch vehicles will be available at the time of the launch vehicle procurement. The Launch Services Program Information Summary describes the **two launch scenarios** that NASA anticipates will be available.

Requirement 95. Proposals shall define the required launch vehicle capability and demonstrate that the mission is **compatible with at least one of the specified launch service scenarios**.

Requirement 96. If launch services not specified as standard launch services in *Launch Services Program Information Summary* are required, the proposal shall include the cost of such services as defined by the POC in the document in the PI-Managed Mission Cost.

Requirement 97. Proposals shall discuss compatibility with the **launch vehicle characteristics and capabilities of both scenarios** provided in the Launch Services Program Information Summary in the Program Library, noting that it is not required that the investigation be compatible with both scenarios.



# Notable Sections and Requirements

## Unencumbered Cost Reserves

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### *5.6.3 Cost Estimating Methodologies and Cost Reserve Management*

Requirement 65. Proposals shall **identify and justify the adequacy of the proposed cost reserves**. Proposals shall include **a minimum of 25% of unencumbered cost reserves against the cost to complete Phases B/C/D** and shall demonstrate an approach to maintaining adequate unencumbered cost reserves through subsequent development and operations phases.

Requirement 66. Although minimum unencumbered cost reserves are not specified in this AO for **Phase E**, proposals shall establish, identify and justify adequate reserves for the phase of the mission.



# Notable Sections and Requirements Schedule in Microsoft Project Format

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## Requirement B-42.

The project schedule shall be additionally provided in Microsoft Project format on each CD-ROM or DVD-ROM submitted. Although the project schedule foldout(s) in Requirement B-41 does not need to have been generated in Microsoft Project, the project schedule provided on each CD-ROM or DVD-ROM shall address the items specified in Requirement B-41 **at a level of detail commensurate with that of the graphical foldout**. The Microsoft Project schedule **is not intended to be a fully Integrated Master Schedule** for the project, but rather, it is to be a representation of the summarized schedule foldout that provides a quantified data set that will facilitate understanding of the proposed flow of development activities, timelines, milestones, schedule reserves, and risk. Although tasks in this high-level summary schedule are not expected to be fully linked to their predecessor and successor tasks, **the level of linkage detail should support the assignment of the critical path in the graphical foldout**. Task links are also needed to identify points of assembly, integration, and testing in the schedule and links to major milestones.



# Notable Sections and Requirements

## Adjusted AO Cost Cap

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### APPENDIX C / GLOSSARY OF TERMS AND ABBREVIATIONS

**Adjusted AO Cost Cap** — The value to which the proposal's PI-Managed Mission Cost is limited, 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.



### **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)) or any Co-I requires concurrence by NASA.



## Major Partners

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### 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, PI-Team-Developed 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

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### ***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

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## 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.

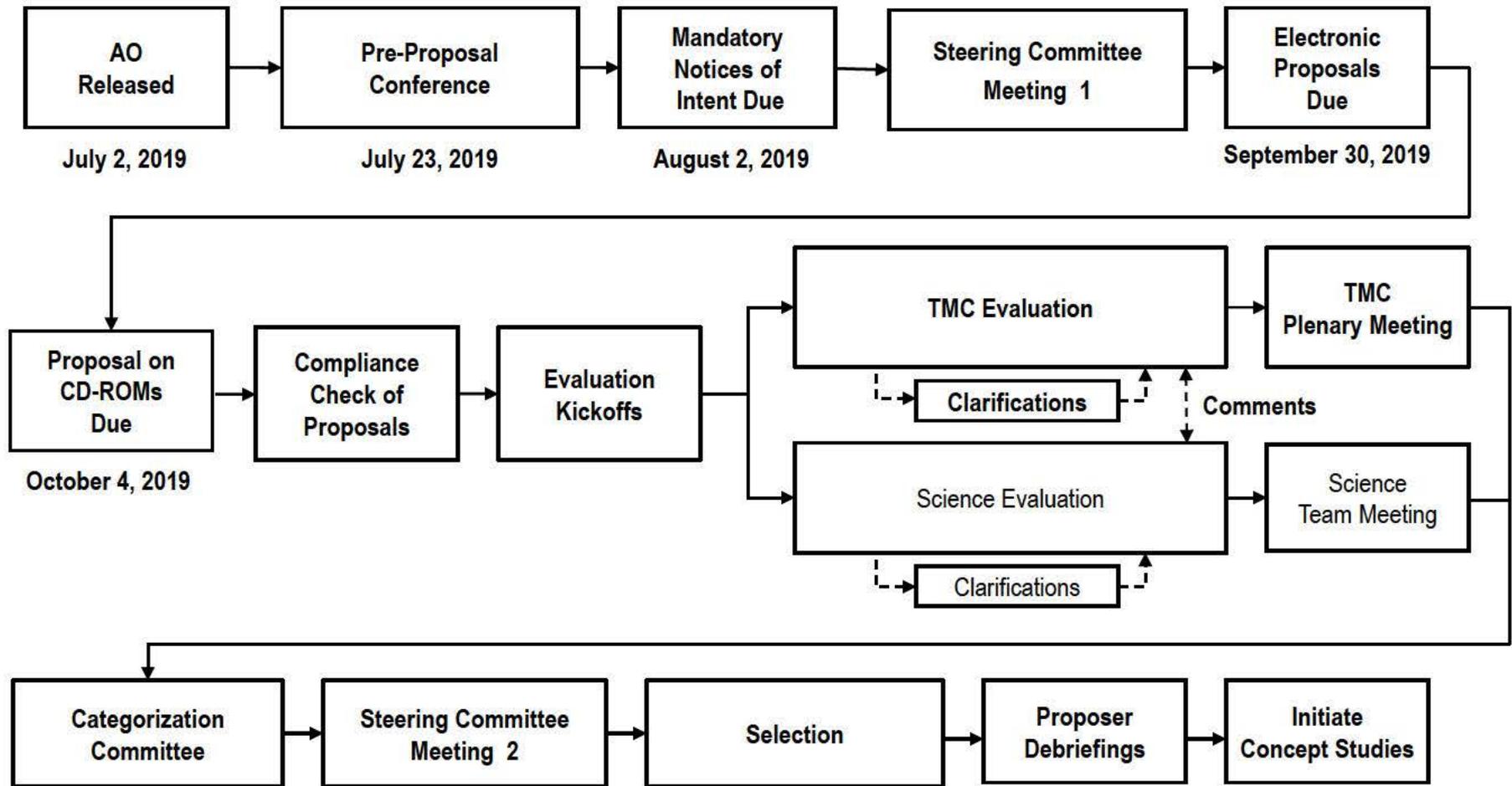
**TMC Evaluation:** The purpose of the TMC evaluation is to assess the likelihood that the submitted investigations' technical and management approaches can be successfully implemented *as proposed*, including an assessment of the likelihood of their completion within the proposed cost and schedule.



# TMC Evaluation

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## AO Flow





# TMC Evaluation

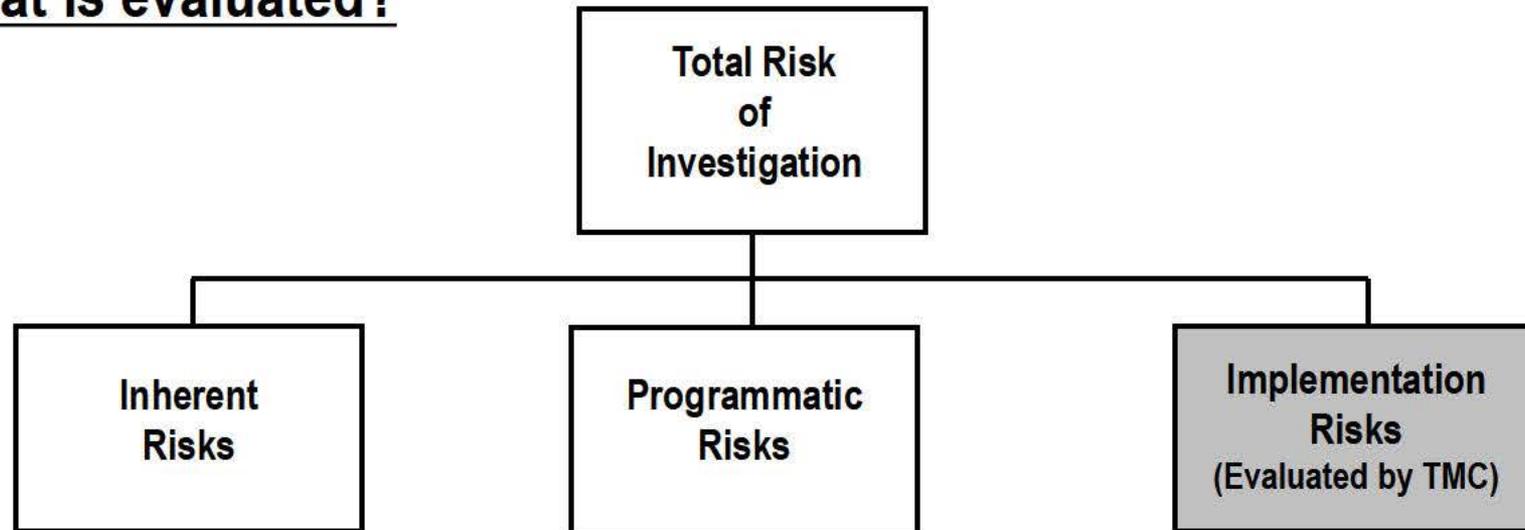
## TMC Proposal Evaluation Factors:

- 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

## What is evaluated?



Risks that are unavoidable to do the investigation:

- Launch environments
- Space environments
- Mission durations
- Technologies or technology extensions
- Unknowns
- Etc.

Risks that are uncertainties due to matters beyond project control:

- Environmental Assessment approvals
- Budgetary uncertainties
- Political impacts
- Late/non-delivery of NASA provided project elements
- Stability and reliability of proposed partners and their contributions
- Etc.

Risks that are associated with implementing the investigation:

- Adequacy of planning
- Adequacy of management
- Adequacy of development approach
- Adequacy of schedule
- Adequacy of funding
- Adequacy of Risk Management (planning for the known and unknown)



## 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 is 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 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

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## 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 the proposal.
- The Heliophysics Explorers Program Lead 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

## 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

## 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					
		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 proposal-by-proposal basis. Depending on proposed PI-Managed Mission Cost, some columns may not apply.



# TMC Evaluation

## 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

## 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

## 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 (<https://explorers.larc.nasa.gov/HPMIDEX/programlibrary.html>).

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



# Questions

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## Questions

Any subsequent questions pertaining to the TMC Evaluation of HEP 2019 MIDEX AO proposals *must* be addressed to:

Dr. Dan Moses

Heliophysics Explorers Program Lead Scientist

Planetary Science Division

Science Mission Directorate

National Aeronautics and Space Administration

Washington, DC 20546-0001

Telephone: 202-358-0058

Email: [Dan.Moses@nasa.gov](mailto:Dan.Moses@nasa.gov) (subject line to read “2019 Heliophysics MIDEX”)