Jupiter Europa Orbiter (JEO) Proposal Evaluation Processes

Jay Bergstralh
Science Office for Mission Assessment
NASA Langley Research Center

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General Policies

Evaluation Criteria and Selection Factors

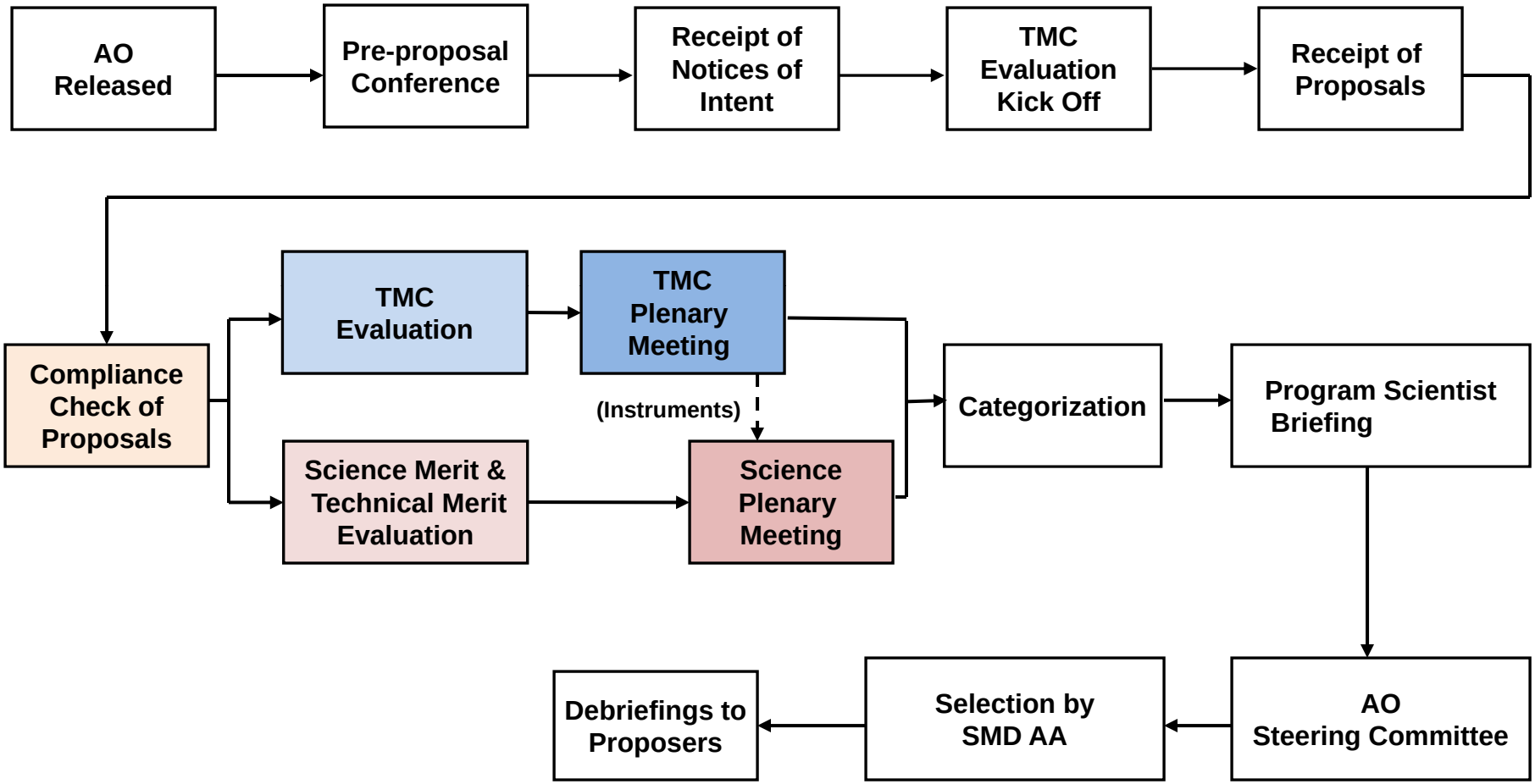
- Evaluation Criteria
  - Scientific merit of the proposed investigation
  - Implementation merit and feasibility of the proposed investigation
  - Technical, management, and cost (TMC) feasibility, including cost risk, of the proposed investigation
- Weighting
  - The first criterion is weighted approximately 40%
  - The second and third criteria are weighted approximately 30% each
- Other Selection Factors
  - NASA SMD cost
  - Programmatic factors

Evaluation Ground Rules

- All Proposals will be evaluated to uniform standards established in the AO and without comparison to other proposals
- All reviewers will be peers of the proposers in the areas they evaluate
- Proposers are presumed to be the experts on the contents of their proposals
- Proposals are presumed to be at pre-Phase A level of maturity; consequently, proposers receive the benefit of reasonable doubt

Step 1

Step 1 Proposal Evaluation Process Flow



Science Evaluation Process

Science Panel Evaluation Criteria

- Scientific merit of the proposed investigation
- Science Implementation merit and feasibility of the proposed investigation

Science Panel Composition and Organization:

- The JEO Program Scientist will lead the Science Panel
- Science Panel reviewers are typically, but not exclusively, recruited from the academic, governmental, and industrial research communities
  - Additionally, the science panel may call upon external/mail-in reviewers if there is a need for expertise in a specific technology or scientific objective that is not represented on the panel

Science Panel Evaluation Process

- The Science Panel will evaluate Scientific Merit and Science Implementation Merit and Feasibility of each proposal
  - Science Panel reviewers will review proposals as directed by the Program Scientist
  - At the science plenary meeting, the panel will compile findings, expressed in terms of major and minor strengths and weaknesses, for each proposal
  - The TMC Panel will assist the Science Panel by providing technical comments pertinent to Science Implementation Merit and Feasibility
  - Evaluations of all proposals will be reviewed during the plenary meeting to ensure that the evaluation criteria and factors established in the AO have been applied uniformly and in an appropriate and fair manner
- The science evaluation of each proposal will result in narrative findings, expressed in terms of major and minor strengths and weaknesses, as well as adjectival ratings

Science Strength and Weakness Definitions

- Major Strength: A facet of the response that is judged to be well above expectations and contributes substantially to the merit
- Major Weakness: A deficiency or set of deficiencies taken together that are judged to detract substantially from the merit
- Minor Strength: A strength that substantiates the merit
- Minor Weakness: A weakness that detracts from the merit

Science Rating Definitions

- Excellent: A comprehensive, thorough, and compelling proposal of exceptional merit that fully responds to the objectives of the AO as documented by numerous and/or significant strengths, and having no major weaknesses.
- Very Good: A fully competent proposal of very high merit that fully responds to the objectives of the AO, whose strengths fully outbalance any weaknesses.
- Good: A competent proposal that represents a credible response to the AO, having neither significant strengths nor 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).

Technical, Management, and Cost (TMC) Evaluation Process

TMC Evaluation Criterion

- Technical, management, and cost feasibility, including cost risk, of the proposed investigation

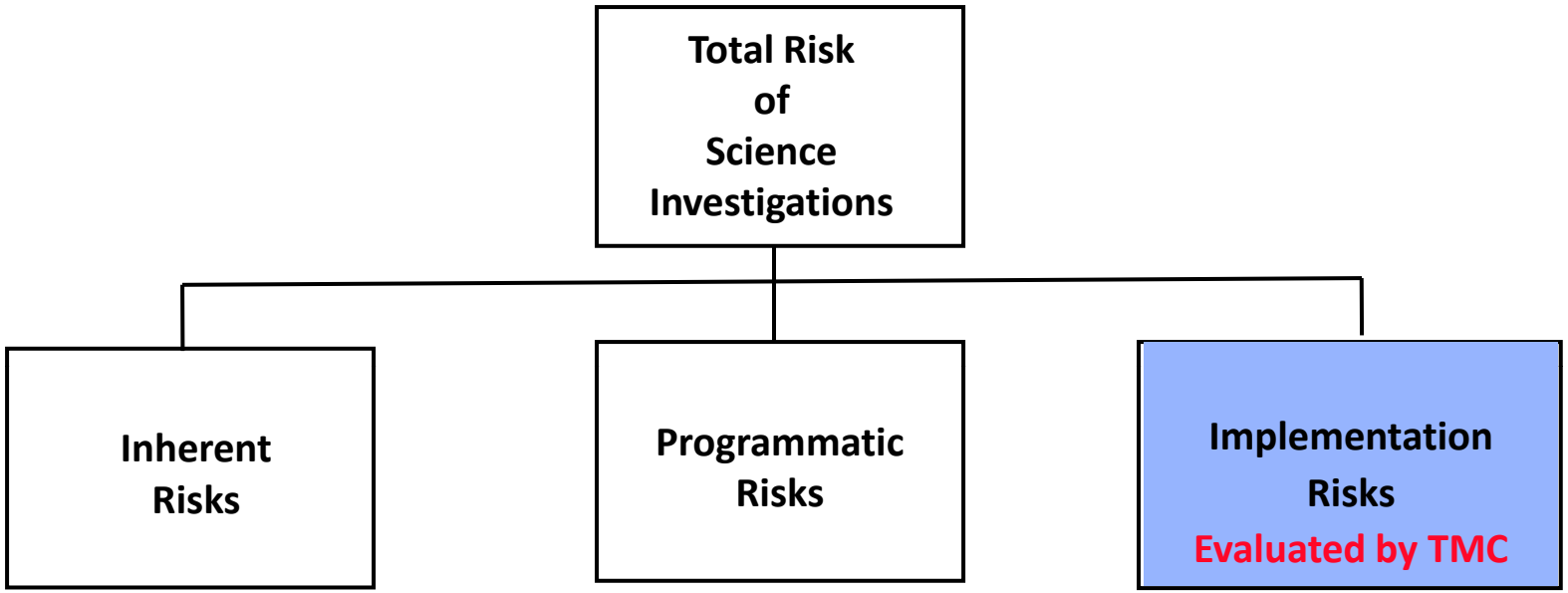
CAVEAT

The AO is currently in DRAFT form and its contents, including the TMC Sub-Factors presented on the next chart, are under discussion. Proposers are responsible for reading the final AO, which will fully describe the TMC Sub-Factors that will be used in this evaluation process.

TMC Evaluation Factors and Sub-Factors

- **Instrument**
  - Instrument Design, Accommodation, and Interface
  - Design Heritage
  - Environment Concerns
  - Technology Readiness
  - Instrument Systems Engineering
- **Management and Schedule**
  - Roles and Responsibilities
  - Team Experience and Key Individuals' Qualifications
  - Project Management and Systems Engineering
  - Organizational Structure and Work Breakdown Schedule (WBS)
  - Implementation plan for Step 2
  - International Participation
  - Risk Management, Including Descope Plan and Decision Milestones
  - Project-Level Schedule
  - Proposed Subcontracting Plans and SDB Participation.
- **Cost**
  - Basis of Estimate (BOE)
  - Cost Realism and Completeness
  - Cost Reserves by Phase
  - Comparison with TMC Estimates (IncludingParametric Models/Analogies)

Risks for Science Investigations



Risks that are unavoidable:

- Launch environments
- Space environments
- Unknowns
- Etc.

Risks that are uncertainties beyond project control:

- Budgetary uncertainties
- Political impacts
- 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 known & unknown)

TMC Panel Composition and Organization

- The Acquisition Manager, a civil servant in the Science Office for Mission Assessment (SOMA) at NASA Langley Research Center, will lead the TMC Panel
  - SOMA works directly for NASA Headquarters and SOMA personnel are firewalled from all other LaRC personnel
- TMC reviewers are a mix of the best un-conflicted contractors, consultants, and civil servants who are experts in their respective fields
  - Additionally, the panel may call upon specialist reviewers if there is a need for technical expertise that is not represented on the panel
- The TMC panel will evaluate technical, management, and cost feasibility, including cost risk, of each proposal
- A TMC Steering Group consisting of the Acquisition Manager, the Program Scientist, and experienced reviewers will review evaluations of all proposals to ensure that the evaluation criteria and factors established in the AO have been applied uniformly, in an appropriate and fair manner

TMC Pre-Plenary Process

- Over a period of several weeks, TMC reviewers will evaluate the proposals individually
- Via teleconferences, the reviewers will identify preliminary major and minor strengths and weaknesses in the proposals
- When all of the proposals have been thus evaluated, the TMC will send each proposal team a list of preliminary major weaknesses identified in their proposals
  - Each team will have an opportunity to identify where, within the proposal, are data and/or wording that mitigate or refute a major weakness

TMC Strength and Weakness Definitions

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

TMC Plenary Process

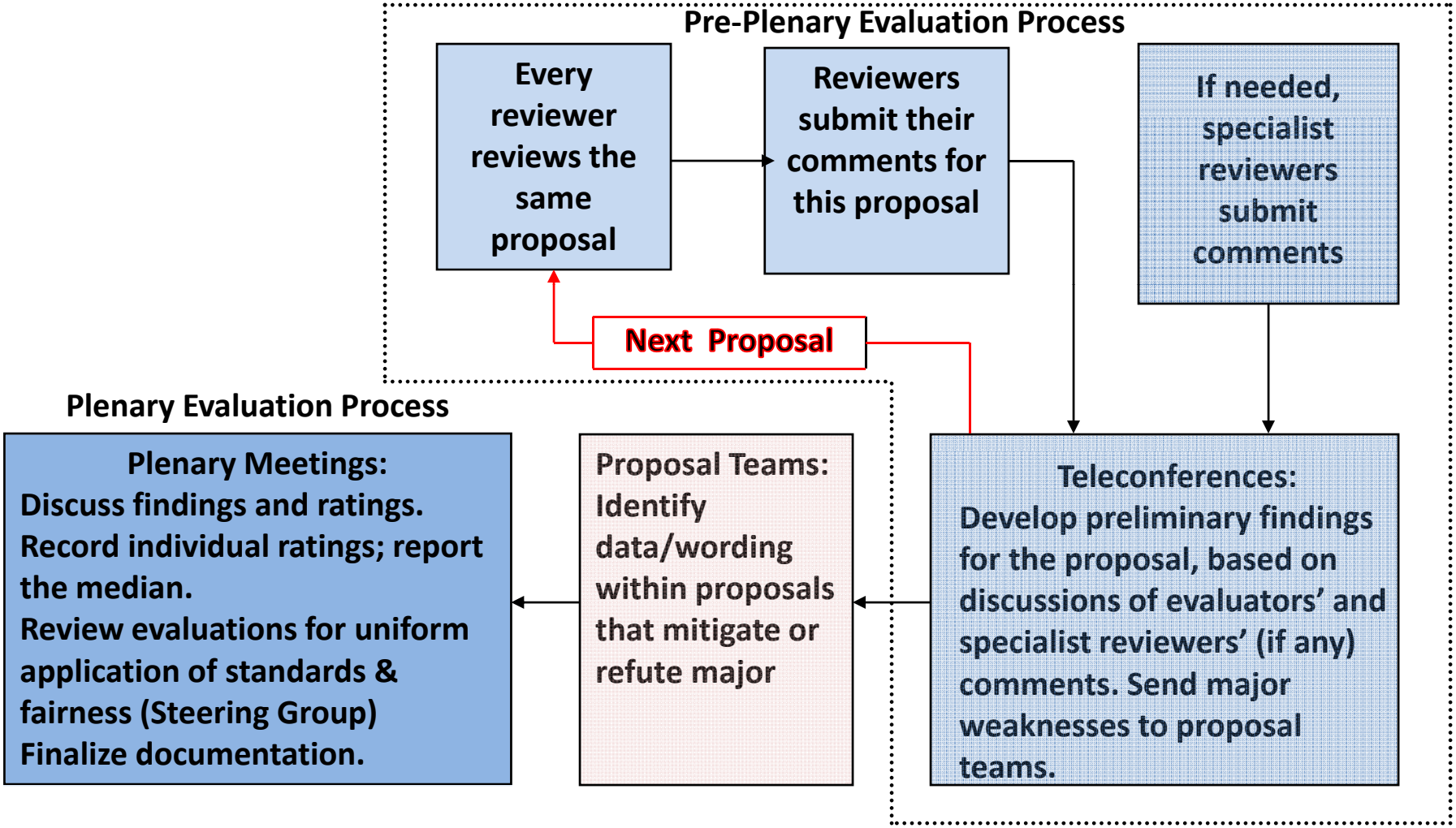
- When all proposals have been reviewed, a plenary meeting will be convened, with all reviewers attending
- Over a period of several days, all proposal evaluations will be discussed, updated, and refined during three rounds of discussions
  - Responses from proposal teams to their initial major weaknesses will be evaluated and considered
  - The steering group will review the evaluations of all proposals during the plenary meeting to ensure that the evaluation criteria and factors established in the AO have been applied uniformly and in an appropriate and fair manner
  - Final evaluation of each proposal will result in narrative findings, expressed as strengths and weaknesses, as well as adjectival scores expressed as levels of risk

TMC Risk Rating Definitions

- 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 within the available resources.
- Medium Risk: Problems have been identified, but are considered within the proposal team's capabilities to correct within the available resources, with good management and application of effective engineering practices. 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: In Step 1, minor strengths and weaknesses do not affect these risk ratings

TMC Evaluation Flow



Step 2

Step 2 Evaluation Process

- Step 2 is the evaluation of Concept Study reports developed during Phase A by the proposal teams selected in Step 1
- The evaluation is generally similar to Step 1; *e.g.* the top-level evaluation criteria are the same:
  - Scientific merit of the proposed investigation
  - Implementation merit and feasibility of the proposed investigation
  - Technical, management, and cost (TMC) feasibility, including cost risk, of the proposed investigation
  - All of the criteria factors in the AO apply to evaluation of the CSRs
- Differences:
  - The CSR Guidelines incorporate additional factors in the criteria, to evaluate Phase A levels of maturity
  - Primary emphasis is on technical, management, and cost issues
  - Face-to-face CSR Reviews will provide opportunities for reviewers to question proposal teams directly
  - In Step 2, minor strengths and weaknesses <u>do</u> affect the risk ratings

Step 2 Science Evaluation Process

- **Scientific Merit of the Investigation***:* There are two components of the Step 2 scientific merit evaluation
  - Scientific Merit of the Proposed Investigation: The JEO Program Scientist will determine whether implementation and/or cost issues that may have emerged in the course of the Phase A concept study have effected significant changes to the science objectives of the Baseline and Threshold Science. If there are no significant changes to the science objectives, the peer review panel findings from Step 1 will remain unchanged. If there are significant changes, a peer review panel will reevaluate the scientific merit of the objectives in light of these changes. The factors for reevaluating this criterion will be the same as those used for the Step 1 proposal review
  - Scientific Merit of Multi-Instrument Investigations: A peer review panel will evaluate the merit of multi-instrument investigations incorporated from the Investigation Scientists

Step 2 Evaluation Process

- **Scientific Implementation Merit and Feasibility of the Investigation:** The (TBD) panel will re-evaluate this criterion from data supplied in the CSR and at the site visit
  - All of the factors defined in the AO for this criterion apply to CSR assessments
  - An additional factor, Maturity of proposed Level 1 science requirements, will be assessed. This factor includes assessment of how the Level 1 requirements will achieve the objectives of the Baseline Science Investigation and the Threshold Science Investigation

Step 2 Evaluation Process

- **Feasibility of the Investigation Implementation, Including Cost Risk:** The TMC panel will re-evaluate this criterion from data supplied in the CSR and at the CSR Review
  - All of the factors defined in the AO for this criterion apply to CSR assessments
  - An additional factor, Approach and feasibility for completing Phase-B, will be assessed. This factor will be evaluated on the basis of completeness of Phase B plans, to determine the adequacy of the Phase B approach.
  - Other factors may be added as needed

Step 2 Evaluation Process

- Over a period of several weeks, TMC reviewers will evaluate the CSRs individually
- *Via* teleconferences, the reviewers will discuss their findings with other members of the evaluation team
- When all of the CSRs have been thus evaluated, an initial plenary meeting will be convened to identify significant issues
  - For each CSR, the plenary will compose a list of questions of clarification for all significant issues
- Following this plenary, each proposal team will have a face-to-face CSR Review with the TMC reviewers
  - CSR Reviews will be conducted in a central location, each will last half a day, and all will focus on clarifying items identified in the initial TMC plenary
  - TMC will send each proposal team its questions of clarification several days before its CSR Review

Step 2 Evaluation Process

- At the CSR Reviews, the proposal teams will have the opportunity to respond to the questions of clarification
  - TMC Reviewers may ask verbal follow-up questions of clarification
- When all of the CSR Reviews have been completed, a second plenary meeting will be convened to finalize risk ratings based on information in the CSRs and clarifications derived from the CSR Reviews

Street Smarts for Proposers

(The distilled wisdom of countless TMC panels)

Typical TMC Evaluation Questions

- Can the overall investigation approach lead to successful implementation as proposed?
- Does proposed design/development of the investigation lead to a reasonable probability of accomplishing its proposed objectives?
- Does proposed design/development of the investigation include all needed tools?
- Are technology advances required to accomplish the proposed objectives?
- Is the proposed design/development of the investigation sufficiently resilient (e.g., money, mass, power, *etc.*) to accommodate development uncertainties?
- Are there sufficient resources (time & $) to correct identified problems?
- Is the Risk Management approach adequate to identify problems with sufficient warning to allow for mitigation without impacting the investigation's objectives?
- Does the proposal team understand the known risks, and are there adequate fallback plans to mitigate them, to ensure that investigation can be completed as proposed?

Typical TMC Evaluation Questions

- Is the schedule workable?
  - Does it reflect an understanding of work to be done and the time it takes to do it?
  - Does it lead to a reasonable probability of delivering the investigation on time to meet JEO project schedules?
  - Does it include sufficient schedule margin?
- Can the proposed management approach (e.g., institutions and personnel, as known, organization, roles and responsibilities, experience, commitment, performance measurement tools, decision process, *etc.*) lead to successful completion of investigation? Is the PI in charge?
- Does the investigation, as proposed, have a reasonable chance of being accomplished within the <u>proposed</u> cost?
  - Are proposed costs within appropriate caps and profiles and does the cost estimate cover <u>all</u> costs including full-cost accounting for NASA Centers?
  - Are costs phased reasonably?
  - Is there evidence in the proposal that supports confidence in the proposed cost?
  - Does the proposal team recognize all potential risks/threats for additional costs or cost growth (e.g., late deliveries of components)?

Characteristics of Low Risk Ratings

- The proposal team has thoroughly identified all risks for the project, and has provided credible plans to mitigate or retire these risks.
- There is no risk for which there is neither a workaround nor a sound plan to develop and qualify the risk item.
- The proposal team and each of its critical participants are competent, qualified, and demonstrably committed to executing the project.
- The project will provide reasonable visibility to NASA for oversight.
- Demonstrably, the proposal team has thoroughly analyzed all project requirements, and consequently the proposed resources are adequate to cover all projected needs, including a percentage for growth during the design and development, and an additional margin for unforeseen difficulties.
- The schedule includes adequate reserves to find and fix problems.
- All contributions are backed by credible letters of commitment.
- Demonstrably, the proposal team understands the serious consequences of failing to meet technical, schedule, or cost commitments for the project

Characteristics of High Risk Ratings

- Technical Design Margins (Mass, Power, etc.)
  - Proposal provides insufficient data to verify margins independently
  - Worse, proposal provides conflicting data
  - Worst, proposal provides no data
  - Proposed margins are deemed as too low, based on maturity of the design
- Cost
  - Concerns relating to cost reserve (below AO requirement; too low based on identified liens and/or threats; phasing is inconsistent with anticipated needs).
  - Unable to validate proposed cost
- Instrument Implementation
  - Heritage claims are not substantiated
  - Development risks are inadequately addressed.
  - Inadequate/inconsistent description and detail.
  - Inconsistencies between instrument requirements and bus capabilities.
- Complex Operations
  - Tight scheduling/sequential operations in multiple-instrument payloads.

Characteristics of High Risk Ratings, cont'd.

- Systems Engineering
  - Incomplete flow-down of science requirements to payload/flight system accommodations.
  - Incomplete description of how the systems engineering function will be executed.
  - Inadequate resources allocated to accomplish the systems engineering function.
- Management Plans
  - Confusing/conflicting organizational roles and responsibilities.
  - Lack of demonstrated organizational/individual expertise for specified role.
  - Insufficient time commitments for key personnel.
- Schedules
  - Insufficient detail from which to perform an independent assessment.
  - Inadequate/no schedule reserve identified.
  - Overly ambitious schedules that are not consistent with recent experiences.