TMC Review and Evaluation Process

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TMC Principles

- **All Proposals will be reviewed to identical standards.**
  - Evaluation Plan approved by NASA HQ and in place before Proposals arrive.
  - All Proposals receive same evaluation treatment in all areas and by all reviewers.
  - The TMC process is used by ESSSO to support all OSS evaluations with a standard process.
- **All evaluators are peers in the area of expertise that they evaluate.**
- **Basic Assumption**: **Proposer is the expert on his/her Proposal.**
  - **TMC:** Task is to try to validate Proposer's assertion of Low Risk.
  - **Proposer:** Task is to provide evidence that the project is Low Risk.

TMC Evaluators and Findings

TMC Evaluators are:

- Best (non-conflicted) CS, DOD, contractor, consultant, and other Government personnel available to support the review.
- Peers in the areas of expertise they evaluate.
- Specialists review all Proposals for a particular area of specialty and provide findings, but do not participate in final ratings.

- **TMC Findings are the consensus of the entire TMC Panel.**
  - Findings are defined as either expected (no finding), above expectations (strengths), or below expectations (weaknesses).
  - Findings result in a Risk Rating (Low, Medium, or High).

TMC Evaluation Objective

- The TMC evaluation is to determine, for each Proposal, the level of risk of accomplishing the scientific objectives of the mission, as proposed, on time and within cost.

- Three bands of risk are defined: **Low Risk, Medium Risk, and High Risk.**

- Exactly what constitutes Low, Medium, or High Risk is a complex issue; however, the following general definitions apply:
  - **Low Risk:** No problems exist that cannot be normally overcome within the time and cost proposed. "Envelope adequate"
  - **Medium Risk:** Problems exist, but are not sufficiently bad such that they cannot be overcome with good management and engineering. "Envelope tight"
  - **High Risk:** Major problems and insufficient resources exist to overcome the problems. "Does not fit within the Envelope"

TMC Technical Definitions

- **Envelope:** Resources available to handle known and unknown development problems that occur. Includes schedule and funding reserves; reserves and margins on physical resources such as mass, power, and data; descope options; and fallback plans.
- **Contingency (or Reserve):** When added to a resource, results in the maximum expected value for that resource. Percent contingency is the proposed value of the contingency divided by the maximum expected value of the resource minus the contingency.
- **Margin:** The difference between the maximum possible value of a resource (the physical limit or the agreed-to limit) and the maximum expected value for a resource. Percent margin for a resource is the margin divided by the maximum possible value minus the margin.

Considerations for Mission Investigations

Generally, the degree to which Proposals address the following factors directly relate to the grade of Low, Medium, or High Risk:

Spacecraft

Depth of Detail
Simplicity vs. Complexity
New Technology
Design Life/Reliability
Margins
Heritage/Maturity
Redundancy

Instruments

Requirements/Interface
Complexity/Difficulty
Depth of Detail
Heritage/Maturity
Operations

Mission Design

Depth of Detail
Difficulty/Complexity/Flexibility
Launch Vehicle

Considerations for Mission Investigations (continued)

Mission Ops/GDS/Communications

Facilities (Including Ground Stations)
Complexity
Depth of Detail
Communications Margins
Team Experience and Roles

Systems Engineering

Depth of Detail
Complexity
Quality Assurance
Trades
Integration and Testing

Management/Organization/Structure

Structure and Teaming
Detailed Description (Including SOW)
Maturity
PI/PM Defined Roles
Experience (Org/Key Person)
Commitment

Risk Management

Risk Understanding and Assessment
Reserves and Margins
Technology Risk Mitigation
Descope Plan

Considerations for Mission Investigations (concluded)

Cost and Schedule

Cost Basis: Grassroots and Models
Variety of Techniques
Costs vs. Tasks vs. Organizations vs. Schedule
Cost Reserves and Management
Cost Savings and Heritage
Cost Envelope
Risks, Threats, Mitigation Levels
Cost Caps - Cap vs. 20% Growth Capability
Technical Maturity vs. Cost Estimate
Technical Complexity vs. Cost Estimate
Past Experience of Meeting Cost and Schedule (Phase A only)
Schedule vs. Tasks
Schedule Reserve (Funded and Unfunded) and its Distribution
Schedule Critical Path

Cost Evaluation

- Independent attempt to validate the cost estimate in the proposal.
- Cost Realism: Reported as Cost Risk (Low, Medium, High); based on Models, Analogies, Heritage, and Grass Roots information from Proposals. Everyone is responsible for Cost Realism evaluation, not just Cost Team.
- Initial cost analysis based on Proposals (consistency checks, completeness, basis of estimate, contributions, full cost accounting, reserve levels and management, etc.).
- Several independent cost models used to support cost analysis.
- Analogies are used to support cost analysis.
- Cost risk, threats, and risk mitigation analysis developed and discussed.
- All information from the entire Evaluation Process provides final assessment

Some Characteristics Applicable to a Low Risk Rating

- All risks for the project have been/are being identified and managed by the team, with plans to reduce or retire the risk before launch.
- No risk exists for which there is neither a workaround planned, nor a very sound plan to develop and qualify the risk item for flight.
- The proposed project team and each of its critical participants are competent, qualified, and committed to execute the project.
- The project will be self-managed to a successful conclusion while providing reasonable visibility to NASA for oversight.
- The team has thoroughly analyzed all project requirements, and the resulting resources proposed are adequate to cover the projected needs, including an additional percentage for growth during the design and development (reserve), and then a margin on top of that for unforeseen difficulties.
- Reserve time exists in the schedule to find and fix problems if things do not go according to plan, which is funded apart from the cost reserve.
- Any contributed assets for the project are backed by letters of commitment.
- The team understands the seriousness of failing to meet technical, schedule, or cost commitments for the project in today's environment.

Typical TMC Evaluation Questions for Mission Investigations

- Will overall mission/project design (spacecraft, launch vehicle, ground system, mission ops) allow successful implementation of mission as proposed? If not, are there sufficient resources (time & $) to correct identified problems?

- Does proposed design/development allow the mission to have a reasonable probability of accomplishing its objectives and include all needed tools? Does it depend on new technology that has not yet been demonstrated? Are requirements within existing capabilities or are advances required? Does the Proposal accommodate sufficient resiliency in appropriate resources (e.g., money, mass, power) to accommodate development uncertainties?

- Are the AO cost reserve requirements at the end Phase B met without any liens such as reserve earmarked for incentive fees?

Typical TMC Evaluation Questions for Mission Investigations (continued)

- Is there a Risk Management approach adequate to identify problems with sufficient warning to allow for mitigation without impacting the mission objectives? Does Proposer understand their known risks and are there adequate fallback plans to mitigate them, including risk of using new technology, to assure that the mission can be completed as proposed?

- Is the schedule doable? Does it reveal an understanding of the work to be done and the time it takes to do it? Is there a reasonable probability of launching on time? Does it include funded schedule reserve (apart from the cost reserve)?

Typical TMC Evaluation Questions for Mission Investigations (concluded)

- Will proposed management approach (e.g., institutions and personnel, as known, organization, roles and responsibilities, experience, commitment, performance measurement tools, decision process, etc.) allow successful completion of the mission? Is the PI in charge?

- Does the mission, as proposed, have a reasonable chance of being accomplished within proposed cost? Are proposed costs within appropriate caps and does cost estimate cover all costs including full cost accounting for NASA Centers? Are costs phased reasonably? Is there evidence in the Proposal to give confidence in the proposed cost? Does the Proposer recognize all potential risks/threats for additional costs or cost growth (e.g., added costs of utilizing the Space Shuttle, failed developments, etc.)?

Step 1 TMC Process

- Without interaction, review proposal consisting of:
  - Science in 20 pages
  - Mission implementation in 20 pages
  - Outside the pages limits
    - Cost tables
    - Optional
      - ✓ Master Equipment List
      - ✓ Work Breakdown Structure (WBS)
      - ✓ WBS Dictionary
- How could this process be improved?

Step 2 TMC Process

- Review concept study report consisting of:
  - Science in 25 pages
  - Mission implementation in 98 pages
  - Cost proposal outside the pages limits
- Send questions 6 days before the site visit
- Go on site visit to get answers during 6 hours of presentations, not including breaks, and a 1 hour tour
- How could this process be improved?