TMCO PROCESS

TECHNICAL, MANAGEMENT AND COST EVALUATION (NOT OTHER FACTORS)

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TMC Process

- TMC Team is usually broken into 3 or 4 Sub-panels with 7-10 members
  - 4-6 technical individuals with background in spacecraft systems, integration and test, and instrument systems.
  - 2-3 management individuals for management, systems engineering, and schedule.
  - 1 cost analyst.
  - Other expertise such as communication, attitude control, and mission design is available as needed.
- Each Sub-panel reviews about 10 proposals.
- Each panel member takes an average of 2.5 days per proposal to review and develop individual findings.
- All the individual findings are collected and the panel as a whole comes to a consensus on “Strengths” and “Weaknesses” and whether they are “Major” or “Minor” and develop a proposed Risk Rating.
- The entire TMC Team meets for a week, reviews all the proposal evaluations, and comes to consensus on the Risk Rating and Rationale for each proposal.

WHAT DOES A GOOD PROPOSAL DO?

- It answers the mail.
- It provides the necessary information to validate the design, cost estimates, schedule, and the planned management approach.
- The design demonstrates the application of systems engineering practices.
- There is traceability of spacecraft performance requirements to science objectives, usually in the form of a Traceabilty Matrix or Requirements Flowdown Matrix.

What Leads to Most Major Weaknesses

The major shortcomings of many proposals is the lack of specificity for the mission being proposed. We see many "text book" proposals that could be applicable to any proposal. Buzz-words such as heritage, grass-roots estimate, integrated product design team, etc., by themselves do not get credit unless the proposer demonstrates an understanding of these concepts. Unless the discussion is aimed at the particulars of the mission and the proposed implementation, including any special test requirements, specific risks and mitigation plans, real critical paths, Systems Engineering, I&T, and the roles and experience of the management team, it is impossible to ascertain if the proposers really understand their system and are competent to successfully manage the program.

TECHNICAL

- Provide a Spacecraft Block diagram which depicts redundancy.
- Provide a Master Equipment List (MEL).
- Provide a Traceability Matrix
- Explain deviations from the cited heritage. Stating heritage to a particular design and then promptly deviating from it as the approach is presented. This is an issue for things such as adding a propellant system where the heritage design has none, significant improvements to pointing accuracy and stability or major increases in payload mass.
- Explain novel approaches. You need to explain why you would purposely complicate the system and then need to demonstrate how you will manage that complication through I&T. Most important, you need to state whether or not you have a viable alternate approach.

TECHNICAL-continued

- Demonstrate a basic level of understanding of the instrument accommodation. Many proposals appear to be a science proposal stapled to a spacecraft proposal with little or no evidence that the two parties have discussed the flight system. We would expect to see preliminary estimates of the power use and cycling, heat dissipation, structural compatibility, contamination concerns, jitter sources, operational profile, etc.
- Describe your I&T plans. Present flows for instruments, spacecraft and observatory including environmental tests, performance tests and calibrations to be performed. Describe any unique tests to be performed--simulated zero g for large deployable structures.
- Describe your test philosophy, Protoflight, etc.

MANAGEMENT

- Present a management plan that has the PI clearly in charge of the mission and responsible to NASA for its success. The PI can delegate numerous tasks to Project Manager (PM) and others and still be involved in decisions and the high-level direction of the project.
  - Missions which include multiple organizations, we expect a management plan that clearly shows PI/PM oversight and insight into, and control over, ALL aspects of the project.
- Provide a well thought out Reserves Management Plan for Cost, Schedule and Technical Reserves. How and who tracks these parameters, the process by which they are released, and the PI's role in the decision, either approval, concurrence, or informed, depending on level.
- Describe the role of the Systems Engineering, the relationship to the PM, inputs into decision making, and the tools and processes to be used.

MANAGEMENT---continued

- Risk Management - be candid and complete in evaluating and presenting your risks, including schedule and management challenges. Don't present a "top 5" table and then spend the rest of the section trying to convince reviewers that everything is Low Risk. Demonstrate your understanding of each item and how you will manage or mitigate it. If a development item is identified as a top risk and not shown on the Critical Path then there may be a credibility problem.
- Present a schedule that shows the key milestones, inter-relationship between project elements, the Critical Path and funded schedule margin (in particular, on the Critical Path).

COST

- Bases of Estimate
  - Provide as much "proof" as possible to verify the credibility of their proposed costs. Present the results from the "grass-roots" process with discussion of and results from any validation using cost models, analogies, or other means leaves. It's common to have differences between the proposed costs and results from independent costing methods, but these differences should be noted and explained at a reasonable level of depth to demonstrate understanding of costing issues.
  - Provide a Work Breakdown Structure (WBS). The WBS and the MEL aid us in verifying your cost estimates
  - Ensure the schedule of activities and the funding profile match. A mismatch may indicate either poor planning or an error in the cost table.
- Reserves
  - Provide the rationale for the reserve levels which is based on an understanding of all known project risks and potential cost impacts.
  - Present a reasonable set of descopes that includes timing, cost savings, and mission impacts.

OVERALL GUIDANCE

- Best advice, read the AO and the appendices carefully and provide a coherent response to each request. NASA publishes a lot of guideline documents. The content should be considered and can be rejected by the proposer if there is a reason,**-- it should not be ignored**.
- Why? These guidelines are used to help formulate the evaluation criteria.