

Pluto-Kuiper Belt Mission

AO 01-OSS-01

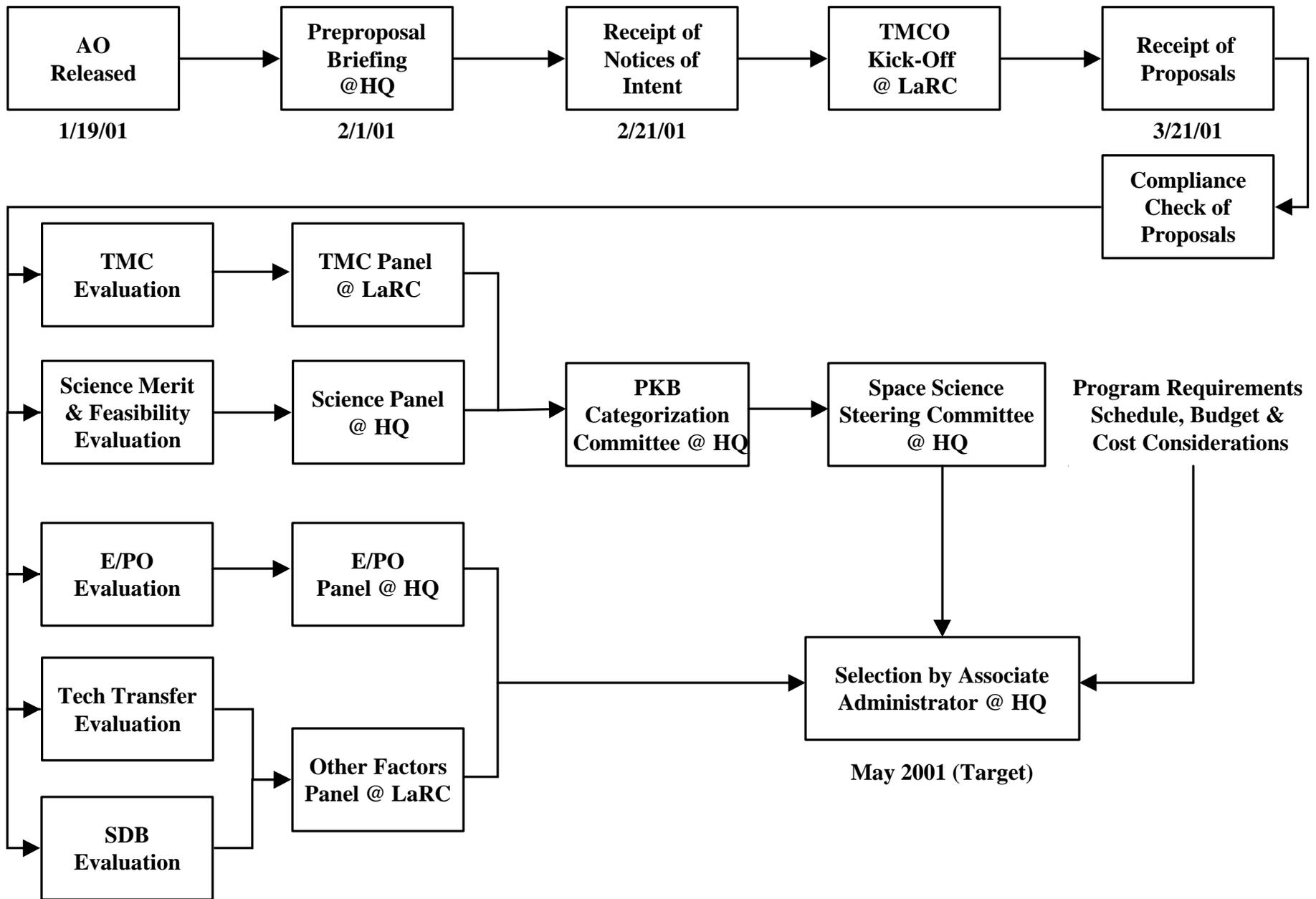
Preproposal Conference

**TMCO Proposal Review &
Evaluation Process**

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Pluto-Kuiper Belt Proposal Selection Evaluation Flow



TMCO 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 TMCO process is used by SSSO 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.**
 - **TMCO:** Task is to try to validate Proposers' assertion of Low Risk.
 - **Proposer:** Task is to provide evidence that the project is Low Risk.

TMCO Process

- **TMCO 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 (instruments, cost, etc.).
- **TMCO Findings are the consensus of the entire TMCO 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 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.

TMC Considerations for PKB Mission Proposals

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

TMC Considerations for PKB Mission Proposals (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

TMC Considerations for PKB Mission Proposals (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 (Comparison to Independent Estimates and Analogies)

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

Schedule vs. Tasks

Schedule Contingency and Reserve (Funded and Unfunded)

Cost Evaluation

- Cost Realism is evaluated; however, a “should cost” or “Government estimate” is not reported.
- 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.
- Cost threats, risks, 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 that the resulting resources proposed are adequate to cover the projected needs, including an additional percentage for growth during the design and development, 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.
- 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 to be Answered

- 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?
- 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?

Typical TMC Evaluation Questions to be Answered (concluded)

- 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 schedule margin?
- 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.)?

TMCO Outreach Considerations

- Generally, the degree to which Proposals address the following factors directly relate to a grade of EXCELLENT, VERY GOOD*, GOOD, FAIR*, or POOR.
*Note: Applicable to E/PO ratings only
- **Education/Public Outreach:** The degree to which the Proposal enhances public understanding of space science (with a particular emphasis on K-14 education) by:
 - Sharing the excitement of space science discoveries with the public.
 - Enhancing the quality of science, mathematics, and technology education, particularly at the precollege level.
 - Helping to create our 21st Century scientific and technical workforce.
- **Technology (both infusion and transfer):** The degree to which Proposal supports the OSS Strategic Technology Goals by:
 - Infusion of Technology (Provides a plan for infusion, Provides heritage references for infused technology, Provides metrics to quantify achievement).
 - Transfer of Technology (Provides a plan to transfer appropriate technology, Identifies potential users, Provides data on why technology is useful).
- **Small Disadvantaged Businesses:** The degree to which the Proposal includes
 - Commitment to involve SDB's and planned SDB subcontracts.
 - Past experience in meeting goals.

Pluto-Kuiper Belt Downselect Evaluation Flow

