Space Science Mission Selections

New Frontiers Acquisition Process and Oversight

Presentation to the

New Frontiers Presolicitation Conference

Dr. Guenter Riegler

Executive Director for Science

Office of Space Science

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There are Two Mechanisms for Space Flight <u>Mission Selections</u>

The Strategic-Planning Cycle:

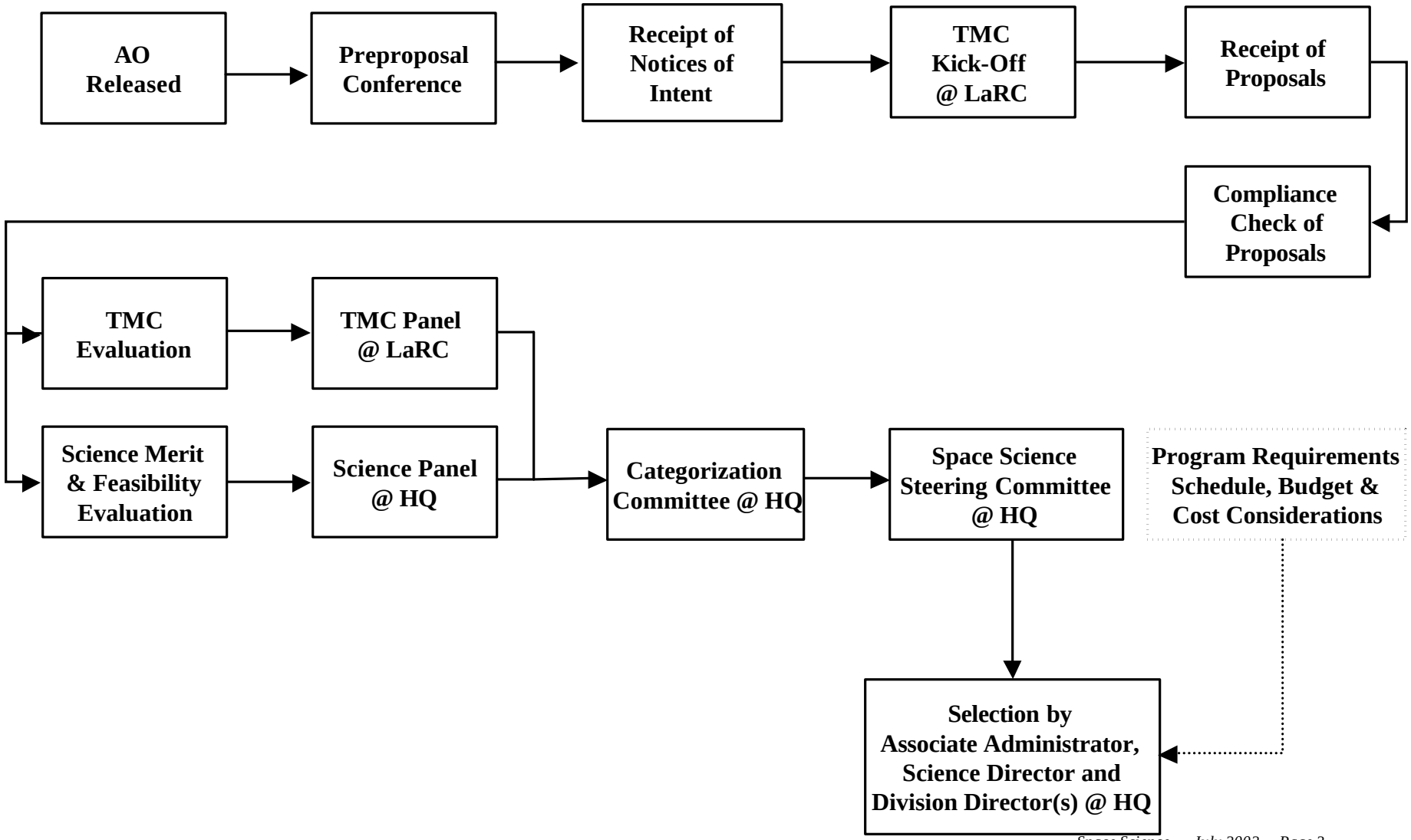
- **As mandated by Congress, every three years the Office of Space Science calls on the science community to advise NASA on strategic priorities for science objectives, as well as for specific missions (Dedicated-purpose missions, "flagship" missions)**
  - Science groups develop discipline-specific "roadmaps",
  - These roadmaps are then combined into a **<u>Space Science Strategic Plan</u>**
  - The science goals and mission priorities are vetted by (1) NASA's formal advisory committees and (2) the National Academy of Sciences

Mission "lines"

- **For mission "lines", Announcements of Opportunity (AOs) are issued periodically to request proposals for PI-class missions**
  - The "Explorer" mission line consists of three mission sizes, and serves the Astrophysics and Sun-Earth Connection disciplines
  - The "Discovery" and "New Frontiers" mission lines serve the Solar System Exploration discipline

Wide range of mission sizes and budgets: from $ ~ 15M for University-Class Explorers to $ > 1B for "flagship" missions

Proposal Evaluation and Selection Process



Definitions of the 4 Categories for AO-Related Proposal Evaluations

Categorization determines the "competitive range" of top proposals (categorization only done by Civil Servants):

- **Category I -- "Well conceived and scientifically and technically sound investigations pertinent to the goals of the program ...offered by a competent investigator...(that is) recommended for acceptance..."**
- **Category II -- "Well conceived and scientifically and technically sound investigations...(that can be) recommended for acceptance, but at a lower priority than Category I."**
- **Category III -- "(Category I)...investigations that require further (technical) development."**
- **Category IV -- "Proposed investigations which are recommended for rejection...whatever the reason" (scientific/technical merits, cost, or objectives).**

Selections are made only from Category I proposals

- **In rare cases, Category III proposals may receive funding for technology development**

Space Science Steering Committee

Purpose:

- **1. To review all evaluation processes and records to assure compliance with Federal Regulations (NFS 1872).**
- **2. To assure that the evaluation processes for all proposals were conducted fairly and evenly.**
- **3. To assure that the quality and completeness of documentation substantiates the categorization findings.**

Composition:

- **An independent panel composed of Headquarters Civil Service personnel, appointed by the Executive Director for Science of the Office of Space Science, none of whom participated in the evaluation or categorization processes.**

Product:

- **A statement of 'findings' as to the fairness of the process and completeness of the records (with a directive for corrective actions if required), and a verification of the Category I or II candidates for selection.**

How To Write A Winning (Hardware) Proposal

The following recommendations – if not adhered to - are most often the root cause of the failure of proposals which are ranked as "Category 4".

1. Focus:

- **Focus your proposal on the main scientific problem you intend to solve, and don't dilute the proposal with less important problems that might also be solved.**
  - Don't use shopping lists of things that will be investigated.
  - TMCO panels typically find that the proposals are trying to satisfy too many requirements, driving up the risk.
- **Show how the instrument performance, data analysis plans, and everything else--including the implementation plans, choice of partners, schedules, and even budget profiles--are tied to the requirements of the investigation.**
  - It is important to follow that focus on the main scientific problem ruthlessly in the plans and let the connection between requirements and plans show in the proposal.

How To Write A Winning (Hardware) Proposal, cont'd

2. **Meet all requirements stated in the Announcement of Opportunity (AO)**
   - **Make sure that the proposal demonstrates that the proposed investigation will satisfy all the requirements in the AO--from budget profile to the quality of data made available to the community.**
     - Many proposals that are rejected have failed in some way to demonstrate that they meet the requirements of the AO.
     - Foreign proposals often neglect the management sections.
     - In some cases, schedule might be critical, but the schedule in the proposal provides no details that would demonstrate that the effort will meet the schedule requirements.
     - In other cases, funding may be limited in the first year or two, but the activities described for the first years do not demonstrate the tough decisions necessary to fit within the budget constraints. These kinds of proposal attributes can drive up what the TMCO panel assesses to be the risk.
     - The key word here is to "demonstrate" how the proposed effort will meet the AO requirements.

How To Write A Winning (Hardware) Proposal, cont'd

3. Be sure to check your cost estimate by some independent method

- **You will need a "Grass roots," "bottoms-up" cost estimate, but these estimates are prone to error.**
  - Nearly every mistake that can be made will lead to an underestimate of the cost.
- **Be sure to check your cost estimate by some means (perhaps by a cost model or by an analogy with a previous investigation), make corrections in your cost estimate, and include in the proposal an explanation of how you validated the cost estimate.**
  - The TMCO panel is not trying to show that your proposed cost is too low. Rather, the panel assumes that your team knows much more than the panel does about how much the investigation is going to cost, but it is the panel's responsibility to validate your cost estimate.
  - The TMCO panel will use models and any analogies that seem appropriate, but the best approach is for your proposal to state clearly how your team validated the cost estimate and to include enough information to allow the TMCO panel to confirm that the estimate is valid.
  - As long as the TMCO panel can agree with your assumptions and get reasonably close to the proposed cost, then the estimate is judged to be valid.