Written Debrief Materials: Overview

For Proposals Submitted to

Announcement of Opportunity #NNH07ZDA003O

Small Explorers and Missions of Opportunity

Release date: September 28, 2007

GROUND RULES FOR THE DEBRIEFING

- This debriefing is a service to the proposing team to provide constructive feedback on the findings of the evaluation process. No debate of these findings is expected/permitted.
- The debriefing will cover your proposal ONLY and we will not comment about findings with regards to other proposals.
- Questions may be asked at any time, however, the debriefing period is limited, therefore, to assure that all findings are covered, all participating will need to be disciplined about the pace of progress.
- One and only one debriefing per team will be given and only in rare cases will questions be answered or actions be completed at any later time than at the debriefing.
- We will provide ALL findings and the TMC Risk Rating. These will be the findings of MANY people (not the Program Officer's or that of the Chairs of the TMC or Science panels): There were approximately 95 people (~40 people in the SMEX TMC review and ~55 people in the science review) involved in producing the findings that will be related to you at this debriefing.
- We will read the findings; notes may be taken; a hard copy of these debrief materials will be provided to you. No recording devices are allowed.
- Please be aware that it is our intention that the debriefings (except for findings) be identical for all proposal teams in all respects to the extent possible.

INTRODUCTION TO THE EVALUATION PROCESS

One of the most important Science Mission Directorate (SMD) activities covered by the NASA Science Management Handbook is the solicitation and selection of research investigations for NASA funding. SMD solicits proposals for basic research investigations using Broad Agency Announcements (BAA's); the most common BAA's are the Announcement of Opportunity (AO) and the NASA Research Announcement (NRA), while less frequent are the NASA Cooperative Agreement Notice (CAN). The distinguishing characteristic of all NASA BAA's is that they solicit ideas for basic research investigations, the end result of which is new knowledge and data that are to be made publicly available.

The document that describes the Announcement of Opportunity process is the NASA FAR Supplement (NFS) part 1872.0, entitled Acquisition of Investigations, which is complete and fully applicable. The NASA FAR Supplement is a component of the Federal Acquisition Regulations (FAR) System, which codifies and publishes uniform policies and procedures for use by all executive agencies in acquiring goods and services. All SMD AO processes are conducted in accordance with the FAR and with NFS 1872. In addition to this authority, the flow of activities and SMD policies involved in the process by which the SMD generates and issues AO's and reviews and selects submitted proposals is found in the NASA Science Management Handbook. The Small Explorer (SMEX) and Missions of Opportunity (MO) selection process for Phase A concept studies was conducted in accordance with these Federal regulations and SMD policies.

The Small Explorer (SMEX) and Missions of Opportunity (MO) Announcement of Opportunity (AO) NNH07ZDA003O was released on September 28, 2007 (http://nspires.nasaprs.com). In addition to scientific research investigations to address the broad scientific goals of the heliophysics and astrophysics program, the AO also invited Focused Opportunity for Solar Orbiter (FOSO) proposals through amendment to the AO posted on October 22, 2007. A second amendment posted on November 27, 2007, permitted scientific payloads on the Japanese HTV cargo vehicle to the International Space Station. The FOSO opportunity will not be discussed further in this document.

On January 15, 2008, NASA received SMEX and Mission of Opportyunity (MO) proposals submitted in response to the AO. On February 12, 2008, NASA received additional MO proposals for ISS payloads submitted in response to the second amendment to the AO. A compliance check was performed on all proposals and some proposals were found to be non-compliant. The affected PI's were informed and, with their permission, all submitted copies of the proposals were destroyed. Of the 32 compliant SMEX proposals, 14 were Heliophysics and 17 were Astrophysics proposals. Of the 17 compliant MO proposals, 6 were Heliophysics and 11 were Astrophysics proposals.

OVERVIEW OF THE EVALUATION AND SELECTION PROCESSES

NASA takes seriously its responsibility for ensuring that proposals are treated with the utmost confidentiality and are evaluated fairly and objectively without actual or apparent conflict of interest on the part of the reviewers. Therefore, it is NASA policy that NASA Civil Service personnel are in charge of and direct all aspects of the evaluation and, including the identification and invitation of peer review personnel, in-person monitoring of the deliberations of any peer review panel, and the adjudication of conflicts of interest that may be declared by participating program, project or panel personnel.

The Evaluation and Selection processes are shown in Figure 1. These processes were managed by the Explorer Program Scientist, who served as the NASA Program Officer. Implementation was managed by the SMEX and Mission of Opportunity Acquisition Managers in the Science Support Office (SSO) of the NASA Langley Research Center.

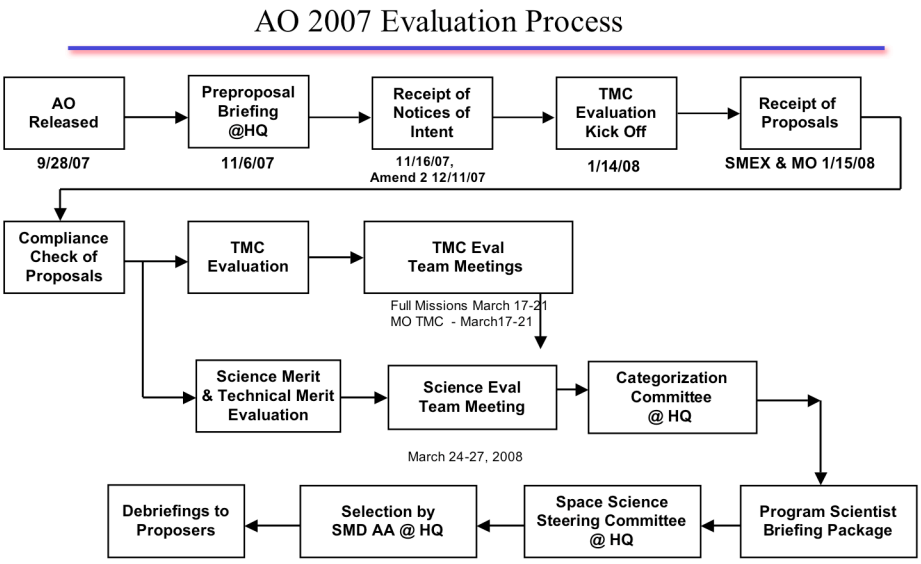

Table 1

EVALUATION PROCESS

All proposals were evaluated against the criteria given in the AO guidelines by panels of individuals who are scientific and/or technical peers of the proposers. The evaluation criteria were grouped as follows:

- Scientific Merit;
- Scientific Implementation Merit, including technical merit; and
- Technical, Management, and Cost (TMC) feasibility, including cost risk.

In addition, as stated in the AO, the Education and Public Outreach (E/PO) component of the proposals was evaluated against the E/PO evaluation criteria given in the AO, and comments provided. If a Student Collaboration was proposed, its separability was evaluated by the TMC team, science merit by the science panel, and E/PO merit by the E/PO panel. E/PO was not factor in proposal categorization.

The merit of the proposals was determined by peer reviewers while meeting as a panel. The science panels were managed by HQ Discipline Scientists, while the TMC panels were managed by the SMEX and MO Program Officers and Acquisition Managers. Reviewers were selected based on their known expertise relevant to the content of each proposal and avoidance of conflicts of interest. The panels were augmented, as required, by the use of Specialized Expert Reviewers and by reviews solicited by mail.

Reviewers were instructed to judge the proposals against the stated evaluation criteria and not to compare proposals to which they had access, even if they proposed similar science. Whether by mail, expert review, or as a member of the panel, NASA instructed all reviewers to base their comments on the specified evaluation criteria, to maintain confidentiality of their activities and of all proposals and

review materials provided to them, to avoid any activities that may have led to actual or apparent conflicts of interest, and to report any actual or apparent conflicts as became known to them during the course of the review activities. All reviewers not employed by the U.S. Government submitted a signed *Nondisclosure Agreement* before they were allowed to review any proposal.

Both SMEX and MO proposals were evaluated by the same science panels. The panels were instructed to review them independently of each other, as the two competitions were independent, having separate budgets. There were separate TMC panels for the two kinds of proposals.

SPECIFIC EVALUATION PROCESSES

Science Evaluation Process:

The Program Scientist appointed a committee of Discipline Scientists in the Heliophysics and Astrophysics Divisions to review all the proposals and place proposals similar in science and technology areas into panels. The 49 (32 SMEX and 17 MO) proposals were placed into 7 panels as follows.

- Geospace
- Solar Physics
- Gamma Ray Astronomy
- X-Ray Astronomy
- Extragalactic Astronomy
- Interstellar Medium and Planetary Systems
- Fundamental Physics

Each panel was monitored by a Discipline Scientist, who was the NASA Program Officer (PO) responsible for the panel. Six of the PO's were Civil Servants and one was a non-conflicted IPA. The PO's ensured that the panel had the required expertise to provide all panels a fair and equitable review. Names of panelists were kept strictly confidential and not even revealed to other panelists (except the Chair) prior to the in-person panel meeting, in order that each panelist would develop his/her own unbiased evaluation of proposals. Proposals were made electronically accessible to reviewers (both panelists and external) approximately 4 weeks prior to the in-person panel meeting. All proposals were assigned a primary reviewer and one or more secondary reviewers. All reviewers were required to place their reviews on the web a couple of days ahead of the panel meeting. Only those reviews marked as final were available for viewing by those reviewers who had completed their reviews.

During the panel review, each proposal was evaluated against the criteria given in the AO. The panel developed strengths and weaknesses for each proposal and prepared a report reflecting the panel findings. A summary rationale for the evaluation was also developed.

Principles for TMC Evaluation:

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.

All Proposals were reviewed to identical standards.

- The TMC process is used by SSO to support all SMD evaluations with a standard process.
- Evaluation Plan approved by NASA Headquarters and in place before proposals arrive.
- All proposals receive same evaluation treatment in all areas and by all reviewers.

TMC Findings are those of the entire TMC panel.

- Findings that are above expectations are documented as strengths. Findings that are below expectations are documented as weaknesses. Findings that are as expected are not documented.
- Specialist reviewers provided findings but did not vote for Risk ratings.
- Final ratings were agreed to, in plenary, by way of individual voting. The final rating was found by polling the TMC members for their vote. The rating was the MEDIAN of the votes; it did NOT require unanimous agreement.

TMC Risk Rating:

The TMC evaluation is to determine the level of risk of accomplishing the scientific objectives of the investigation, as proposed, on time and within cost. Figure 2 illustrates the type of risks that are, and are not, evaluated by the TMC panel.

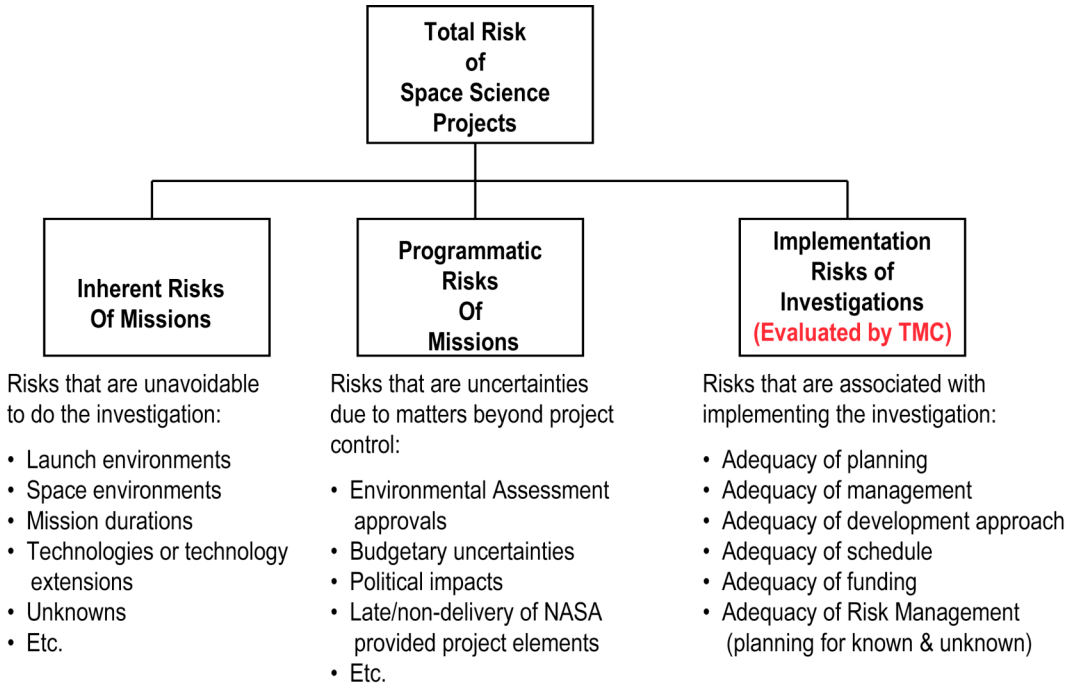

Figure 2: Categories of risk that are evaluated by the TMC processes

The TMC evaluation results in a narrative text, as well as a TMC grade. There are three possible TMC grades: Low Risk, Medium Risk, and High Risk. These rates are illustrated as an "envelope" concept in Figure 3.

- **Low Risk**: There are no problems 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. "Envelope more than adequate"
- **Medium Risk**: Problems have been identified, but are considered within the proposal team's capabilities to correct with good management and application of effective engineering resources. Technology may not be ready, but available time and money should get it there. Investigation may be complex and resources tight. "Envelope adequate but tight"
- **High Risk**: Problems are of sufficient magnitude such that failure is highly probable. "Envelope inadequate"

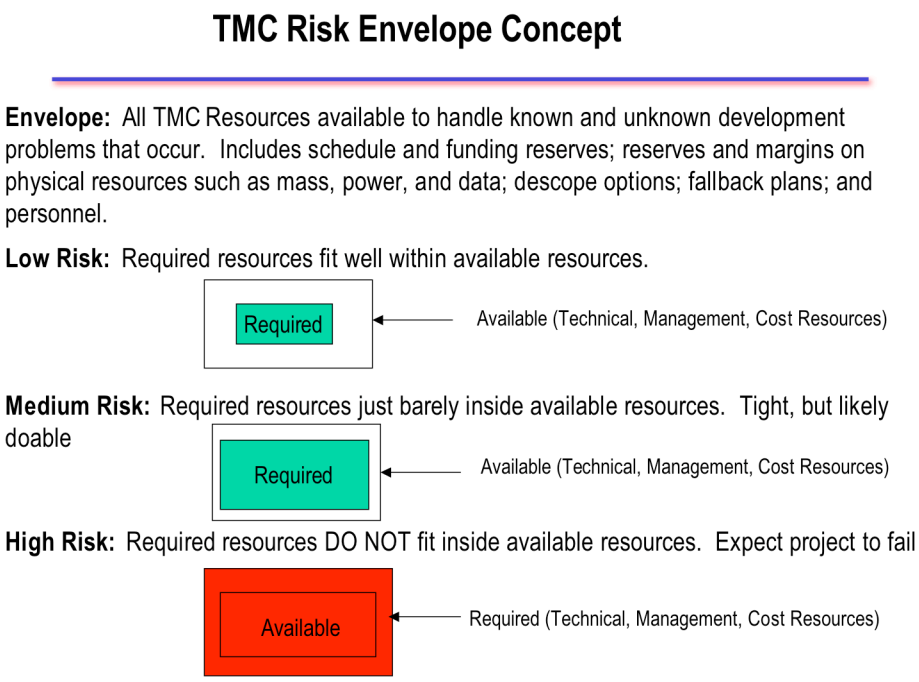

Figure 3: TMC Envelope Concept: Includes all TMC-criteria Resources available to handle known and unknown development problems that occur. Includes schedule and funding reserves; reserves and margins on physical resources such as mass, power, and data; descope options; fallback plans; and personnel

TMC Evaluation considerations generally include the following items:

Instrument: Instrument Design, Accommodation, and Interface, Design Heritage Environment Concerns, Technology Readiness, Instrument Systems Engineering

Mission Design and Operations (N/A for MO's): Mass Margins, Trajectory Analysis, Launch Services, Concept of Mission Operations, Ground Facilities–New/Existing, Telecom

Flight Systems: Hardware/Software Design, Design Heritage, Spacecraft Systems Design, Design Margins (Excluding mass), Qualification and Verification, Assembly, Test, and Launch Operations, Mission Assurance, Development of New Technology

Management, Organization, & Schedule: Management and Schedule, Roles and Responsibilities, Team Experience and Key Individuals Qualification, Project Management and Systems Engineering, Organizational Structure and Work Breakdown Schedule (WBS), International Participation, Risk Management, Including Descope Plan and Decision Milestones, Project-Level Schedule, Proposed Subcontracting Plans and SDB Participation.

And **Cost.**

Cost Analysis:

An initial cost analysis was accomplished based on information in the Proposal (consistency, completeness, proposed basis of estimate, contributions, use of full cost accounting, maintenance of reserve levels, and cost management, etc.). Figure 4 illustrates the process and elements that make up the TMC cost assessment.

- Several independent cost models were used to analyze proposed cost.
- The cost threats, risks, and risk mitigation analysis were analyzed.
- All information from the entire Evaluation Process provided the final assessment.

Cost Realism is only reported as a Cost Risk based on Models, Analogies, Heritage, and Grass Roots information from Proposals. Cost evaluation is INPUT to TMC risk rating; it is not a separate element.

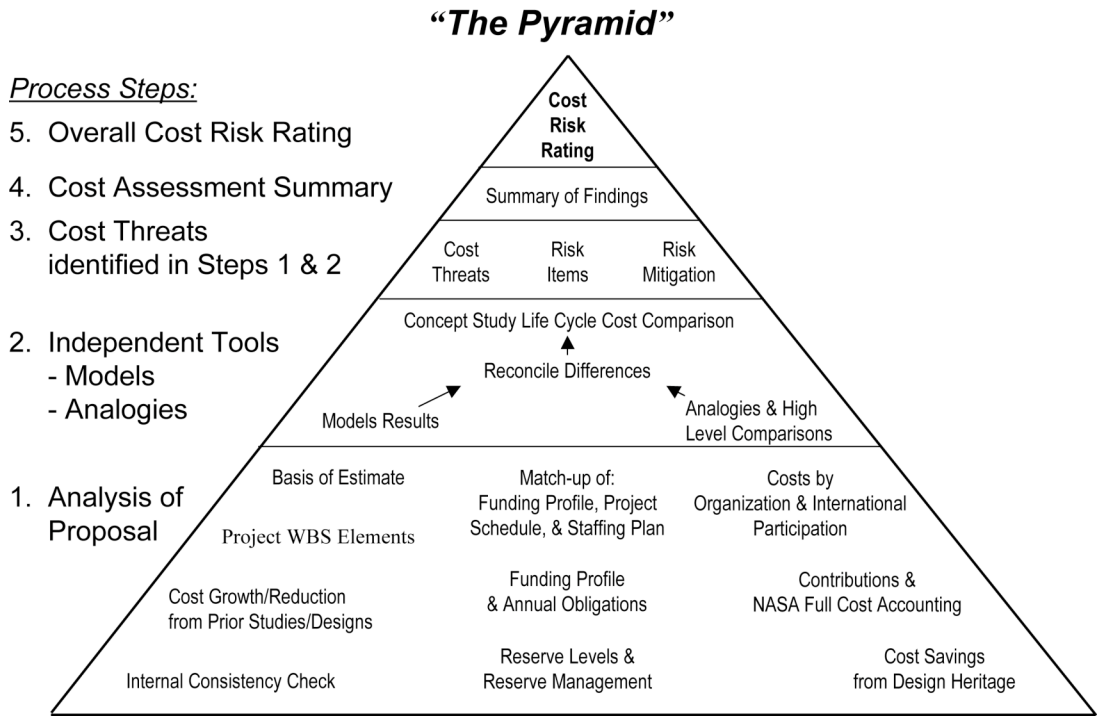

Figure 4: Processes and elements contributing to the TMC Cost Assessment.

CATEGORIZATION PROCESS

Two separate Categorization Subcommittees of the Steering Committee, one for SMEX missions and one for MO, were appointed by the SMD Chief Scientist, who was the Chair of the Steering Committee. Each Subcommittee was composed of SMD Civil Servants. The Explorer Program Scientist was the non-voting Chair of the Categorization Subcommittees. Each Categorization Subcommittee was provided the review reports of the proposals four working days ahead of the panel meeting. The Subcommittee members were required to read all the review reports and assign categories based on the definitions of the categories given in the AO ad the weights assigned in the AO to the three evaluation criteria. In order to ensure that reports for each proposal were given a thorough review, two members were assigned to read each report carefully. At the Categorization Meeting, the Program Officers presented the strengths and weaknesses of each proposal as evaluated by the peer review committees. These were discussed in depth by the Subcommittee, and Categories assigned to each proposal.

STEERING COMMITTEE

The final process before selection was a review of the entire AO process by a Steering Committee, Chaired by the SMD Chief Scientist. Once the Committee had determined that all AO rules had been correctly executed, the Chair approved proceeding towards selection.

SELECTION PROCESS

The SMEX Program Scientist, Program Executive and Program Officers briefed the Selection Board on the results of all proposals. The Selection Board consisted of the Selecting Official, who is the SMD Deputy Associate Administrator (DAA) and the Division Directors of the four SMD Science Divisions as voting members, and the SMD Chief Scientist, Director of Management and Policy Division, and senior members of NASA procurement, Office of External Relations, and Legal Office, as no-voting members. All Category I proposals were recommended for selection, and Category II proposals were recommended for selection at a lower priority than Category I proposals.

SELECTION

After careful consideration of the evaluation findings and incorporating programmatic and budgetary reasons, six SMEX proposals were selected for the conduct of Phase A concept studies (the AO says approximately 6-8 will be selected). Six proposals were selected so that, at the end of Phase A and following the evaluation of the concept studies, NASA expects to identify some missions with compelling science objectives that can be realized with acceptable implementation risk

The six SMEX proposals listed below were selected to conduct a Phase A concept study. Following this concept study, a decision to continue two missions for further development for flight is expected to occur.

The following SMEX proposals were selected:

- ***Coronal Physics Explorer (CPEX)*, PI: Dennis G. Socker, Naval Research Laboratory, Washington D.C**. - CPEX will use a solar coronograph to study the processes responsible for accelerating the solar wind and generating the coronal mass ejections that can impact the Earth.

- ***Gravity and Extreme Magnetism SMEX (GEMS),* PI: Jean H. Swank, Goddard Space Flight Center, Greenbelt MD -** GEMS will use an X-ray telescope to track the flow of highly magnetized matter into supermassive black holes.
- ***IRIS - Interface Region Imaging Spectrograph*, PI: Alan M. Title, Lockheed Martin Space Systems Co., Palo Alto CA -** IRIS will use a solar telescope and spectrograph to reveal the dynamics of the solar chromosphere and transition region.
- ***Joint Astrophysics Nascent Universe Satellite(JANUS),* PI: Peter W.A. Romig, Pennsylvania State University, University Park PA -** JANUS will use a gamma-ray burst monitor to point its infrared telescope at the most distant galaxies to measure the star-formation history of the universe.
- ***Neutral Ion Coupling Explorer (NICE),* PI: Stephen B. Mende, University of California, Berkeley CA-** NICE will use a suite of remote sensing and in situ instruments to discover how winds and the composition of the upper atmosphere drive the electrical fields and chemical reactions that control the Earth's ionosphere.
- ***Transiting Exoplanet Survey Satellite (TESS),* George R. Ricker, Massachusetts Institute of Technology, Cambridge MA -** TESS will use a bank of six telescopes to observe the brightest 2.5 million stars and discover more than 1,000 Earth-to-Jupiter-sized planets around them.