

Discovery Missions Program: Lessons Learned Workshop Minutes 2/28/00

On February 28, 2000, the Fourth Workshop on Discovery Missions Program: Lessons Learned was convened by Chairman Dr. Jay Bergstralh of NASA Headquarters at the Lunar and Planetary Institute, Houston, Texas. Dr. Bergstralh provided an introduction to the group that included a discussion of the purpose of the workshop, introduction of key participants, and laid out the agenda for the proceedings.

Following these matters, the rest of the morning was consumed with NASA presentations provided by Dr. Jay Bergstralh, NASA Discovery Program Scientist, Wayne Richie from the Langley Space Science Support Office, and Jeff Rosendhal from NASA Headquarters. The briefings, provided a complete review of the Discovery AO process as well as the planning for the current AO. Jeff Rosendhal of NASA Headquarters gave a presentation on Space Science Education and Outreach. There was a presentation from Dr. Eileen Stansberry of JSC on Curtatorial Services. Dave Jarrett of the NASA Management Office also provided a presentation on the Discovery Program Management.

After lunch, one members of the community provided a briefing: Greg Vane of JPL presented the group with a discussion topic on future Discovery requirements. This presentation is also provided.

The remainder of the conference was spent reviewing and responding to all of the written questions from the Workshop attendees. Questions were submitted and each was discussed in the Workshop and answers provided by NASA. These Q&A's are provided. At the conclusion of the workshop, a list of issues was developed (attachment 10) which will require headquarters resolution.

Attachments Provided

- | | |
|----------------------|---|
| Attachment 1 | List of Attendees |
| Attachment 2 | Presentation by Dr. Jay Bergstralh |
| Attachment 3 | Presentation by Wayne Richie |
| Attachment 4 | Question and Answers |
| Attachment 5 | Contact Info for Jeff Rosendhal Presentation |
| Attachment 6 | Information on John Schafer's Presentation |
| Attachment 7 | Presentation by Dr. Eileen Stansbery |
| Attachment 8 | Presentation by Dave Jarrett |
| Attachment 9 | Presentation by Greg Vane |
| Attachment 10 | AO Issues from Lessons Learned |

Attachment 1

**Discovery Missions Program:
Lessons Learned Workshop
List of Attendee's 2/28/00**

Name	Organization
Robert Smith	Aerospace
Sanjay Limaye	University of Wisconsin – Madison
Kevin Baines	JPL
Paul Weissman	JPL
Greg Vane	JPL
Jeau – Charles Lede	Aurora Flight Services
Todd Mosher	Aerospace
Harvey Willenberg	Boeing
Jeffrey Rosendhal	NASA HQ
D.E. Shemansky	University of Southern California
Jeff Prebce	Spaceworks
Ron Black	Southwest Research
David Jarrett	NASA Discovery Program Office
John Schafer	NASA HQ
Walter Harris	University of Wisconsin
Henry Hogue	Boeing
Lin Midkiff	Aerospace
Dan Toomey	Spectrum Astro
Larry Frank	JHU/APL
Rich Huebschman	JHU/APL
Cynthia Faulconer	Lockhead Martin
Eileen Stansbery	NASA-JSC

**Discovery Missions Program:
Lessons Learned Workshop
List of Attendee's 2/28/00**

Name	Organization
C.J. Russell	UCLA
Trevor Sarcse	Honeywell
Charles Lillie	TRW
Don Burrowbridge	Orbital Science Corp.
Eric Rice	Orbitec
Alan Delamere	Ball
Will Reynolds	Lunar Cities
Lamont DiBiasi	L. DiBiasi Association
David Gump	Luna Corp
Jim Kaufman	JPL
Bob Kozon	NASA GSFC
Mike Kelley	NASA – JSC
Ron Salazor	JPL
William Whittaker	Carnegie Mellon University
Gary Sneiderman	NASA Goddard
Tom Wynn	NASA Ames
Derek Sears	University of Arkansas
Mike Stancati	SAIC
Ben Clark	LMA
John Schafer	NASA
Wayne Richie	SSSO – NASA
Jay Bergstralh	NASA HQ

Attachment 2

DISCOVERY

AO Overview, Proposal Review Process, Categorization, & Evaluation

Presentation to the Lessons Learned Workshop

Dr. Jay Bergstralh

February 23, 2000

AGENDA

Day 1

8:15 Introduction	Jay Bergstralh
8:30 AO Process and Science Evaluation	Jay Bergstralh
8:50 TMC0 Process	Wayne Richie
9:10 Q & A's	All
10:00 Break	
10:15 Special Presentations/Discussions	
- E/PO	Jeff Rosendhal
- ELV	John Schafer
- Mission Opns/Comm	No Presentation
12:00 Lunch	
1:30 Special Presentations (continued)	
- Curatorial Services	Eileen Stansbery
- Discovery Program Management	Dave Jarrett
2:30 Comments/Presentations by Community Representatives	
- JPL	Gregg Vane
- Industry 1	TBD
- Industry 2	TBD
- Academia PI 1	TBD
- Center PI 1	TBD
5:00 Adjourn	

AGENDA

Day 2

8:00 Continental Breakfast

8:15 Continue Community Presentations as required

TBD

9:10 Discuss Actions/Wrap-up

Jay Bergstralh

11:45 Adjourn

AO HIGHLIGHTS

What's Unchanged in this AO?

- **Two-Phase, One-Step Procurement**
 - Phase I: Solicit science proposals with sufficient implementation information to evaluate risk, expected total cost to NASA, and commitment to other programmatic goals. Select 4-6 proposals and award contracts for Concept Studies, with contract options for Phase B, Phase C/D, and Phase E. (A Mission of Opportunity could be selected for implementation at this point.)
 - Phase II: Evaluate Concept Study Reports, and downselect to one or two investigations for implementation.
- **Science Investigations must support either the Solar System Exploration theme or the search for extrasolar planetary systems element of the Astronomical Search for Origins theme.**
 - Missions intended to achieve same science goals as missions already in Strategic Plan, in same time period, may *not* be proposed.

AO HIGHLIGHTS

What's Unchanged in this AO?

- **Earth Orbital Discovery missions (e.g. telescopes) can be proposed for Shuttle launch**
 - Cost for proposal purposes must be included.
- **Contributions remain at 1/3 of Phase C/D(excluding launch vehicle).**
- **Mission phases may continue to be broken into Phase B, C, D, and E since NPG 7120.5B does not prohibit.**
- **Missions of Opportunity including data buys.**

AO HIGHLIGHTS

What's New in this AO?

- **Cost Cap: \$299M FY 01**
- **Mission launch date nlt September 30, 2006**
- **Missions of Opportunity must require NASA commitment before December 31, 2001**
- **Missions of Opportunity definition and cost cap changed:**
 - Individual investigations may be proposed for flight on **non-Code S missions**. (excluding weapons related military)
 - Cost cap of **\$35** M.
- **Roles and responsibilities for Co-I's must be defined in proposal.**
- **NOI's not mandatory as in AO 98**
- **No requirement for copies of Phase I proposals to Code I @Hq. Will be required at Downselection however.**

AO HIGHLIGHTS

What's New in this AO?

- **“ It is NASA’s intention that low cost, narrowly defined missions will be considered on an equal footing with more expensive, broadly defined missions.”**

AO HIGHLIGHTS

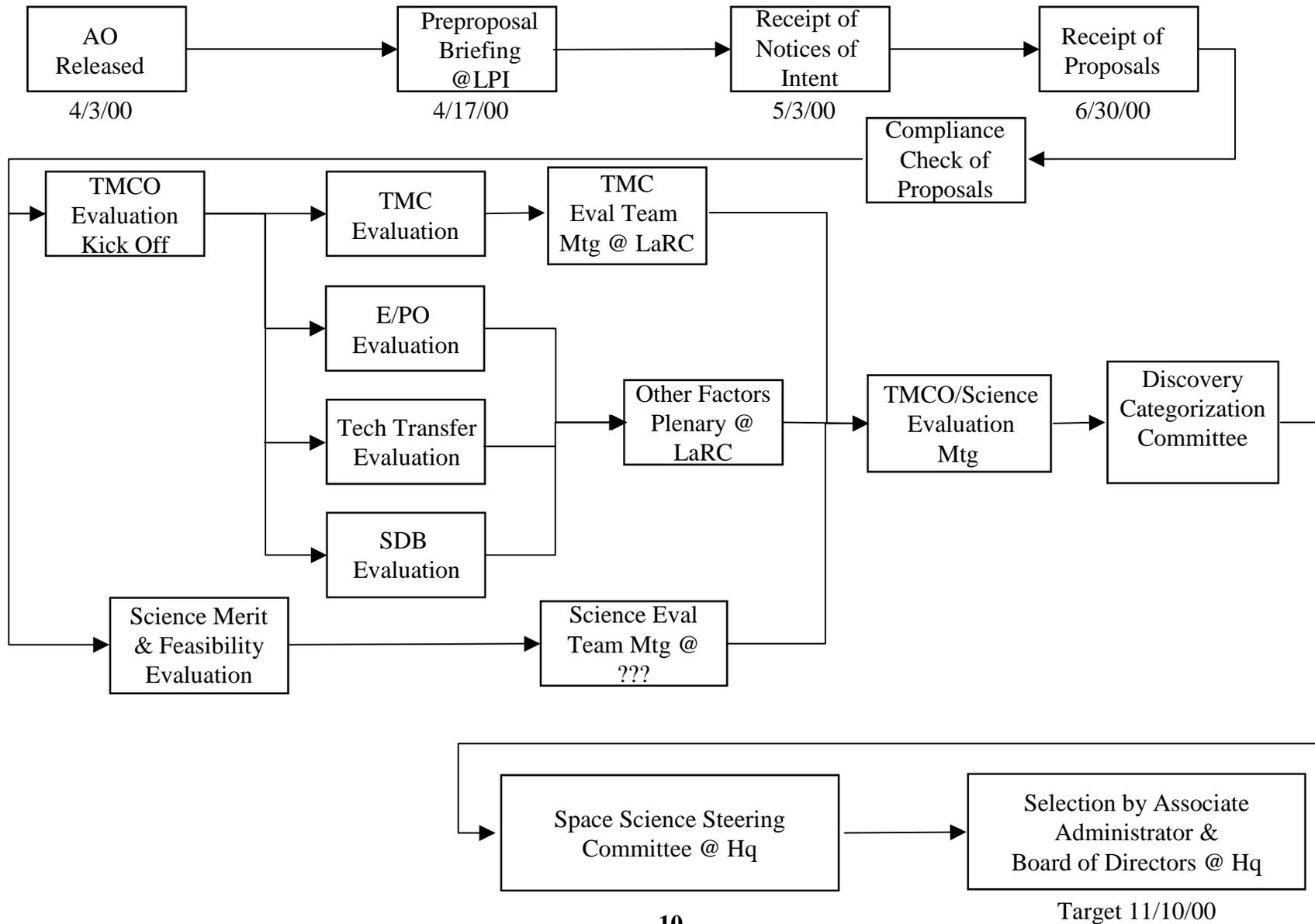
What's Under Consideration?

- **A new class of Discovery Missions: Micromissions**
 - Separate AO to be released next year for this class of missions.
- **ELV Capabilities and Costs**
 - Update this meeting
- **NASA Mission Operations and Comm Algorithm/Costs**
 - Update this meeting
- **NASA Peer Review Contract has changed from LPI to Global Science and Technology with subs IDI and SAIC**
 - Proposal Submittal Address and Location of Preproposal Conference is TBD

Discovery Science Principles

- **Selection of high-quality scientific investigations that assure the highest science value for cost.**
- **Selection of scientific investigations consistent with the OSS Strategic Plan.**
- **To evaluate smaller, lower cost, focused missions on an equal footing with larger, higher cost, wide scope missions.**
- **Basic Assumptions:**
 - **That proposer is proposing science missions with conservative development efforts required.**
 - **That proposer has adequate contingency and reserves to to accomplish the mission...no Hq APA.**
 - **Missions that cannot maintain schedule, budget, and scientific requirements are subject to cancellation.**

DISCOVERY AO Process



Proposal Evaluation Criteria

Proposals evaluated using Six criteria from AO with percentage weight in parenthesis:

- **Scientific merit of the investigation (30)**
- **Total cost of the mission to NASA (20)**
- **Technical merit and feasibility of the science investigation (20)**
- **Feasibility of the mission implementation scheme (20)**
- **Quality of Education and Public Outreach Plans (5)**
- **Quality of Technology, and Small Disadvantaged Business Plans (5)**

Science Evaluation Process

Scientific Merit Score: Numerical Score 1-9 with 1= poorest and 9=Best

Technical Merit and Feasibility: Numerical Score 1-9 with 1=poorest and 9= Best

Science Evaluation Factors

Scientific Merit:

- How well does the mission fill important gaps in knowledge and/or provide for fundamental progress in planetary system(s) science?
- Does the proposed investigation support or complement ongoing missions or provide ancillary benefits to planetary system(s) science?
- At the performance floor, will the investigation still have high scientific value?

Technical Merit and Feasibility:

- Can the proposed investigation approach (measurement objectives, data analysis, etc.) be expected to achieve the proposed scientific goals and objectives?
- Does the science investigation team have the appropriate experience, expertise, and organizational structure to complete the proposed investigation successfully?
- Will the proposed instrumentation support the measurement objectives of the investigation (appropriate type of data with necessary resolution, dynamic range, sensitivity, SNR, etc.)?
- Will the volume of data (or quantity of samples) returned be sufficient to complete the investigation?

Science Evaluation Factors (continued)

Technical Merit and Feasibility: (continued)

- Resiliency: In the event of development problems, will the proposed descoping plan permit “graceful degradation” to performance floor?
- Data analysis and archiving: Is there an approach for designing and delivering standardized (PDS) data products? Will data (or samples) be released to the public domain in a timely fashion? Does the data analysis plan specifically include physical interpretation and publication of results in refereed journals? Are there adequate resources to accomplish these tasks?

Science Evaluation Process

- **Science Evaluators are:**
 - Best (non-conflicted) academic, CS, contractor, consultant, and other government agency personnel available to support the review
 - Peers in the areas of expertise they evaluate
 - External reviewers for all proposals for a particular area of specialty and provide findings but do not participate in final ratings
- **Science Findings:** Are the consensus of the entire panel
 - Every proposal evaluated by a subpanel team composed of multiple reviewers with a mixture of discipline expertise (at least 3 of whom have read each proposal)
 - After subpanel consensus, all proposals and findings discussed by the entire panel (many people)
 - Final ratings are agreed to in plenary

CATEGORIZATION PROCESS

CATEGORIZATION OF PROPOSALS

(NFSD 1872.403)

CATEGORY I: Well conceived and scientifically and technically sound investigations pertinent to the goals of the program and the AO's objectives and offered by a competent investigator from an institution capable of supplying the necessary support to ensure that any essential flight hardware or other support can be delivered on time and that data can be properly reduced, analyzed, interpreted, and published in a reasonable time. Investigations in Category I are recommended for acceptance and normally will be displaced only by other Category I investigations.

CATEGORY II: Well conceived and scientifically or technically sound investigations which are recommended for acceptance, but at a lower priority than Category I.

CATEGORY III: Scientifically or technically sound investigations which require further development. Category III investigations may be funded for development and may be reconsidered at a later time for the same or other opportunities.

CATEGORY IV: Proposed investigations which are recommended for rejection for the particular opportunity under consideration, whatever the reason.

Space Science Steering Committee

- Purpose:**
1. To review Evaluation Process to assure compliance with Federal Regulations (FAR Supplement 1872.406)
 2. To assure that the Evaluation Process conducted fairly and evenly
 3. To assure that the quality of documentation substantiates the findings

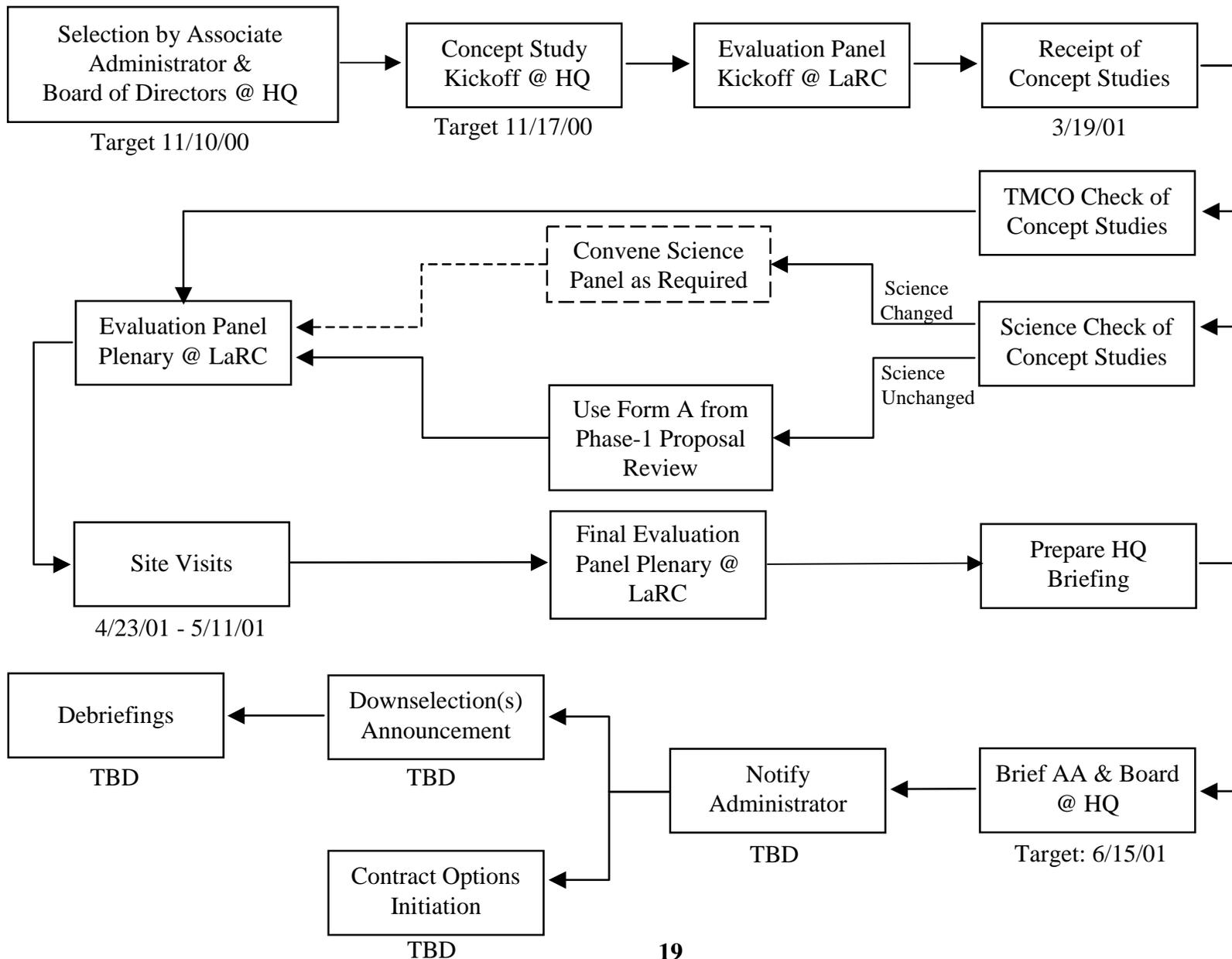
Composition: An independent panel composed of Headquarters Civil Service personnel appointed by the AA of Code S specifically to do this review. None of these reviewers can have participated in the Evaluation or Categorization process.

Function: To assure that the Process has been completed correctly and is ready for Selection, or to direct corrective actions to deficiencies.

Science Evaluation Changes/Issues

- Science Proposal Evaluation Process
 - Except for the addition of instrument technologist to the science panel, no other significant changes are anticipated
 - Any changes/issues the community wants to discuss?
- Science Downselection Process
 - We still would expect Science selected from proposals to be unchanged during downselection, therefore no changes anticipated.
 - We are considering, following the MIDEX example, allowing the PI's to brief the AA and Board on the science value of the investigation at DownSelection.
 - Any changes/issues the community wants to discuss?

DISCOVERY Downselect Schedule/Evaluation Flow



Attachment 3

DISCOVERY AO

Technical, Management, Cost, and Other Program Factors (TMCO) Process

Presentation to the Lessons Learned Workshop

Wayne Richie

February 23, 2000

Discovery AO TMCO Changes/Issues

- TMCO Proposal Evaluation Process
 - No significant changes anticipated.
 - **AO Appendix B** is being modified to clarify information TMC team needs for risk assessment.
 - O = Other Program Factors (E/PO, SDB, Tech) will be be separately evaluated by appropriate peers.
 - Any changes/issues the community want to discuss?
- TMCO Downselection Process
 - No significant changes anticipated
 - A revision to the **Guidelines for Concept Study Preparation** document is in work to incorporate some of the things we learned from the last DS
 - Any changes/issues the community want to discuss?
- Discovery Program Management Office initiation complete
 - Program Manager to brief later regarding post selection requirements.

Discovery TMC0 Principles

- **All Proposals will be reviewed to identical standards**
 - Evaluation Plan approved by Hq and in place before proposals arrive
 - All proposals receive same evaluation treatment in all areas and by all reviewers
- **All evaluators be peers in the area of expertise that they evaluate.**
- **Basic Assumption:** Proposer is the expert on his/her proposal
 - **TMC0:** Task is to try to validate proposers' assertion of Low Risk
 - **Proposer:** Task is to provide evidence that the project is Low Risk

Discovery Proposals

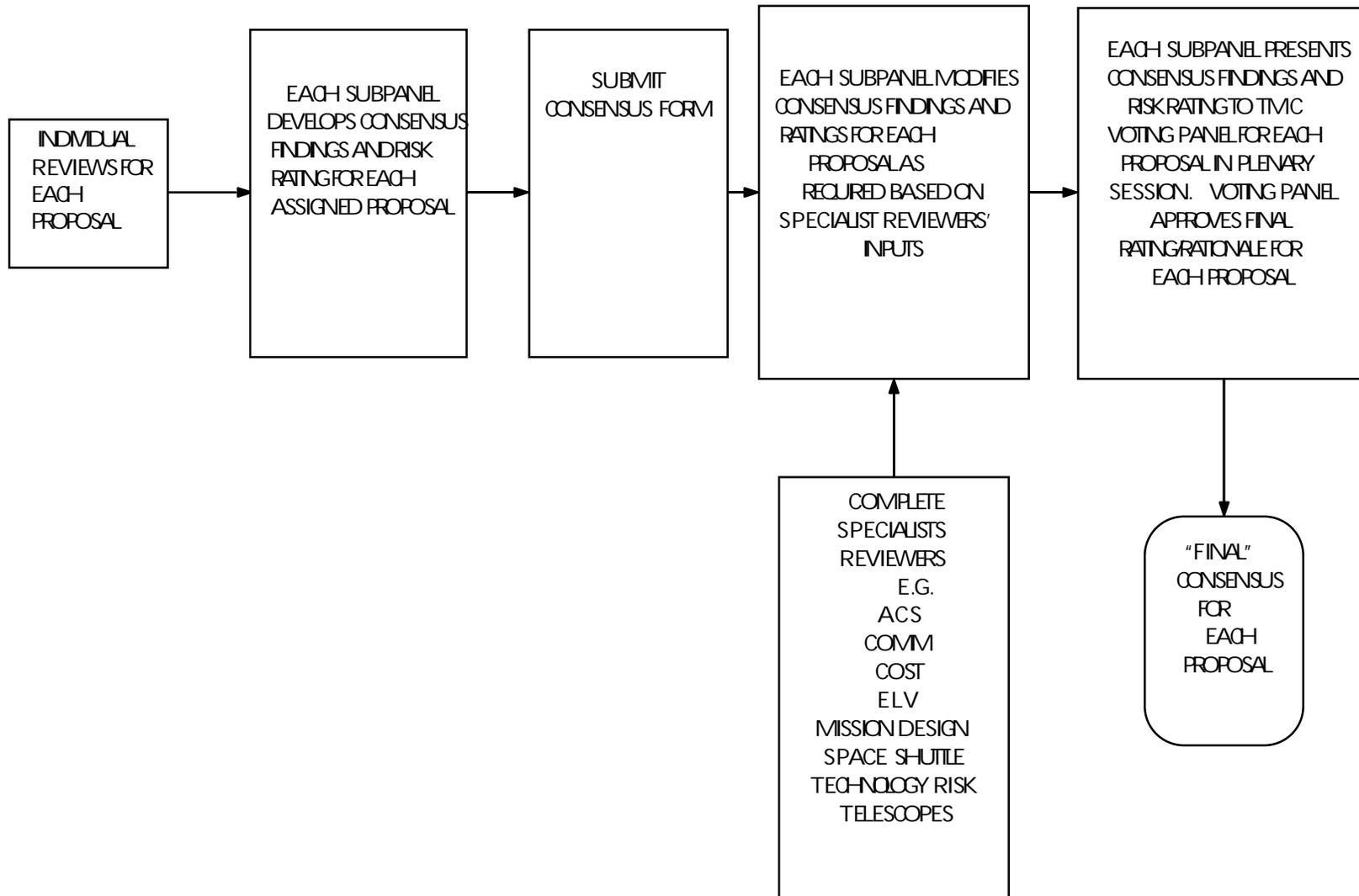
- **To receive a Low Risk rating a proposal should demonstrate that:**
 - All risks for the project have been/are being identified and managed by the team, with plans to reduce or retire the risk before launch.
 - No risk exists for which there is neither a workaround planned, nor a very sound plan to develop and qualify the risk item for flight
 - The proposed project team and each of its critical parts is 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, an additional percentage for growth during the design and development, and then a margin on top of that for unforeseen difficulties.
 - Any assets for the project, contributed or otherwise, are backed by letters of commitment
 - The project team understands the seriousness of failure to meet technical, schedule, or cost commitments of the project: subject to cancellation.

Discovery TMC0 Process

- **TMC0 Evaluators are:**
 - Best (non-conflicted) CS, DOD, contractor, consultant, and other government agency 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 (ELV's, Mission Operations, etc)
- **TMC0 Findings:** Are the consensus of the entire TMC0 panel
 - Findings : As expected (no finding), above expectations (strengths), below expectations (weaknesses). Findings result in Risk rating (low, medium, high)
 - Every proposal evaluated by a subpanel team composed of multiple reviewers (generally 5 or more) with a mixture of discipline expertise
 - After subpanel consensus, all proposals and findings discussed by the entire panel (many people)
 - Final ratings are agreed to in plenary

TMCO Overview

TMC Panel Flow



TMCO Overview

TMC Evaluation Objective

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

3 levels of risk are typically defined: **Low Risk, Medium Risk and High Risk**

High Risk may be defined as: “Even if this is the best science, we recommend that you not pick it. It is very unlikely to be successful, as proposed.”

TMCO Overview

Typical TMC Evaluation Questions to be Answered

Will the overall mission 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 spacecraft design/development allow investigation to have a reasonable probability of accomplishing its objectives? Does it depend on new technology that has not yet been demonstrated? Are spacecraft requirements within existing capabilities or are advances required? Does proposal accommodate sufficient resiliency in appropriate resources (e.g., mass, power, etc.) to accommodate development uncertainties?

Does proposer understand their risks and are there adequate fallback plans to mitigate them, including risk of using new technology, to assure that investigation can be completed as proposed?

TMCO Overview

Typical TMC Evaluation Questions to be Answered (cont'd)

Is the schedule doable? Does it reveal an understanding of work to be done and time it takes to do it? Is there a reasonable probability of launching on time? Does it include adequate schedule margin vs development required?

Will proposed management plan (e.g., institutions (as known), organization, roles and responsibilities, experience, decision making) allow successful completion of investigation? Is the PI in charge?

Are proposed costs within appropriate caps and does cost estimate cover all costs including full-cost accounting for NASA Centers? Are costs phased reasonably? Does the investigation, as proposed, have a reasonable chance of being accomplished within proposed cost? What is the basis of the proposers' cost estimate? Is there evidence in the proposal to give confidence in the proposed cost? Does the proposer recognize unique additional costs of such items as utilizing the Space Shuttle or flying RHU's?

TMCO Overview

TMC Considerations

Spacecraft

Depth of Detail
Simplicity vs Complexity
New Technology
Design Life/Reliability

Margins
Heritage/Maturity
Redundancy
Operations

Instruments

Requirements/Interface
Complexity/Difficulty
Depth of Detail

Impact on s/c design
Operations

Mission Design

Mode
Depth of Detail
Launch Vehicle

Flyby, orbiter, lander, SR, etc.
Difficulty/Complexity/Flexibility
Margins (mass, delta V & propellant)

TMCO Overview

TMC Considerations (cont'd)

Mission Ops/GDS/Communication

Facilities (including ground stations)

Complexity

Depth of Detail

Comm margins

Team Experience/Roles

Systems Engineering

Depth of Detail

Complexity

Quality and Mission Assurance

Trades done or will do

Integration and Testing

Organization & experience

Management/Organization/Structure

Structure tied to Task/Teaming
(WBS/Org Chart)

Detailed description (incl SOW)

Maturity

PI/PM Roles proper

Org/key personnel experience

Evidence of Commitment

Risk Management

Risk Assessment (& understanding)

Reserves and Margins

Technology Risk Mitigation

Descope Plan (decision points
and savings)

TMCO Overview

TMC Considerations (cont'd)

Cost and Schedule

Cost Basis - Grassroots, Models, Other Techniques

Cost Caps - Caps vs. 20%

Cost Envelope (Comparison to parametric estimates and analogs)

Cost Reserves and Management

Cost vs WBS Tasks

Cost Risks and Threats

Technical Maturity (heritage) vs Cost Estimate

Technical Complexity vs Cost Estimate

Past Experience of delivering within cost

Launch opportunities/window

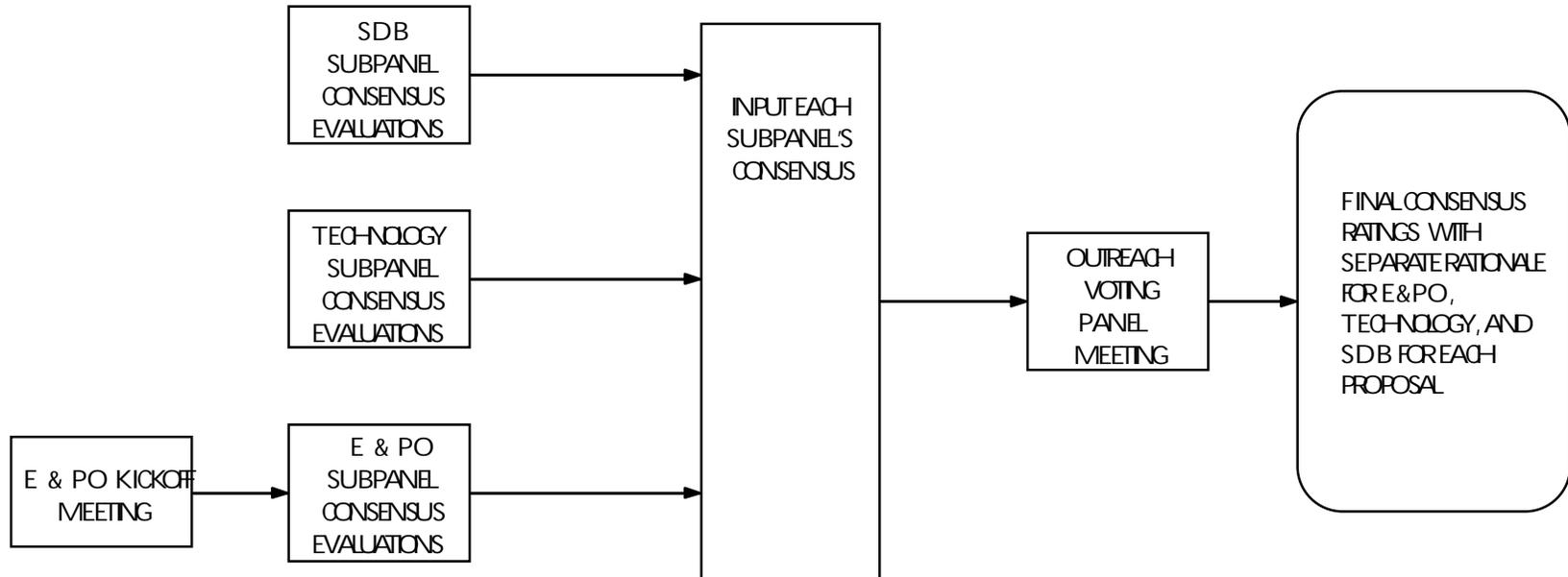
Critical Path

Schedule vs Tasks

Schedule Reserve

TMCO Overview

Outreach Panel Flow



TMCO Overview

Outreach Considerations

Generally, the degree to which proposals address the following factors directly relate to a grade of Excellent, Good, or Poor (Note: E/PO uses 5 grades: Excellent, Very Good, Good, Fair, or Poor)

Education and Outreach (Commitment, not originality, is the key factor)

- Quality, scope, and realism of the E/PO program including realism/adequacy of proposed budget
- Capability/commitment of proposer including science team management
- The establishment or continuation of partnerships with education/public outreach institutions
- Plans for evaluating effectiveness
- Support of national standards and efforts
- Plans to contribute to the education, training, involvement of the underserved, underutilized groups
- Prospects for “multiplier effect” of proposed effort

TMCO Overview

Outreach Considerations (cont'd)

Technology (both infusion and transfer)

- 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 users will find technology useful

Small Disadvantaged Businesses

- Commitment to meet 8% SDB goal
- Past experience in meeting goals
- Planned SDB subcontracts to meet the goal

Future Directions/Changes?

Discovery is a program that belongs to the community. There are, however, many competing interests in Discovery with conflicting needs. Our objective should be to meet as many of the community needs which do not conflict with program goals as possible . We are always open to discussion of the following:

- AO scope, content and evaluation process: Are changes needed to make it better?
- Evaluation criteria: Does it focus on the right things and in proper order?
- Evaluation methodology: Is emphasis put on the right things? What about NASA's treatment of risk?
- Acquisition strategy: Does the 1 step, 2 phase process remain the best approach?
- What about ways to bring desirable missions up to competitive speed without having to compete in the mission AO's (e.g. the San Juan Capistrano Workshop)
- Is the AO evaluation/selection process facilitating effective development of high quality science missions at reasonable risk levels?

Attachment 4

Community Questions and Answers

Q 1: Is there a minimum monetary level for Discovery projects?

A 1: No, in principle there is not, however, careful consideration should be given to appropriate other Announcements of Opportunity since Discovery is primarily seeking investigations for space missions.

Q 2: What level of risk will be assigned to projects using SEP/NSTAR propulsion in the next Discovery proposal evaluation?

A 2: This cannot be answered without evaluating your proposal and the specific use and implementation of the SEP/NSTAR. Proposal risk is assigned on the basis of a complete evaluation of all aspects of each proposal (technical, management, and cost); not on the basis of use/non-use of an enabling technology.

Q 3: Appendix B narrative says Table of Contents is not included in the page limit count. Is this true since the figure on page B-2 shows a limit of 2 pages?

A 3: The figure is in error. Table of Content is not counted against page limits. The total page count is therefore 53.

Q 4: Does a fold out page count as 1 page?

A 4: The total page count is 53. You are allowed up to 5 foldouts each counting as 1 page.

Community Questions and Answers

- Q 5:** Some of the documents in the Discovery Program Library appear to be quite old. Will these be updated?
- A 5:** Yes, all the documents in the DPL will be updated before the AO is released. You will receive our best effort updates for some of these documents today, however, **none are final until posted in the DPL and even then are subject to updates through at least Notice of Intent date.**
- Q 6:** The cost caps for development (\$190 M) and total NASA cost (\$299M) are both unchanged from AO 98 but are now shown as FY 01 dollars. Is this correct?
- A 6:** Yes. At the release of the last AO it was decided to hold Discovery cost cap below \$300M. Although there will be some loss in effective dollars due to inflation, this amount should still provide for adequate mission funding.
- Q 7:** How firm is AO schedule? If AO release slips will NOI, proposal due, etc dates slip?
- A 7:** Dates are as firm as we can make them at this time. Yes, they would need to slip, however, the milestones are geared to important constraints such as obligation of funding, end of year shutdown avoidance, and etc.

Community Questions and Answers

Q 8: Is there a Discovery recommended level for GIGO (Guest Investigators)? E/PO?

A 8: No for GIGO. E/PO guideline is 1-2%.

Q 9: Can the need for a separate E/PO program and proposal be deleted to be consistent with the SMEX and MIDEX AO's.

A 9: No, 1-2% of an almost \$300 M program represents far too significant of NASA investment to not be separately addressed and reviewed.

Q 10: Both the AO and Appendix C directs that the E/PO focus be for K-14, is this a typo?

A 10: No, the intention is that the primary targeted audience be through and beyond K-12 but not necessarily college grads or beyond.

Community Questions and Answers

- Q 11:** Appendix B says that cost data may also be submitted on a Mac/PC compatible floppy disk but does not specify in what application; EXCEL, Word, etc.?
- A 11:** The allowance of cost data to be additionally submitted on a floppy (still needed hardcopy w/proposal as indicated by the AO tables) is an experiment to appease community complaints of not enough room to provide supporting cost data. Appendix B is being revised, but we plan to allow this if it is desirable to the proposers. You may choose whatever application you want but please specify. The AO, however, is specific about the need to supply the data requested in the tables and in the format requested. Submittal of a floppy disk with data in any format and with other supporting cost data is also allowed. The tables, however, are to be the primary review data.
- Q 12:** Since the AO specifies up to \$375 K to be awarded to conduct concept studies, what determines the amount of funding to be received?
- A 12:** \$375K is the present limit. Proposers may request less funding if it is not required.

Late Questions and Answers

Q13: Can proposers use NASA-provided ELV's with capabilities greater than 7925H? If so can cost caps be then adjusted commensurately?

A:13 No, AO is specific on these issues.

Q14: Can a “question period” be added to the evaluation process during which PI's would standby for questions?

A14: A question period is being reinstated into the process as it existed in AO96.

Q15: If selection is based “primarily on science”, why the level of data requested in Appendix B? Can this be relaxed?

A15: AO specifies an evaluation criteria for feasibility of mission implementation. This will be evaluated to the degree possible based on the level of data provided by proposers. Appendix B details parameters that evaluation might look at and requests proposers provide these to the extent known in tables.

Late Questions and Answers

Q16: Appendix B asks for signed resumes. Can the signatures instead be on separate letters of commitment?

A16: The AO will allow signatures on either or both.

Q17: In Appendix C, what is meant by the different PI's in E/PO template #3?

A17: A version of Appendix C has revised the E/PO templates and provided instruction for completion.

Q18: Will electronic submission of E/PO portion of proposals be required?

A18: Yes, See question 26

Late Questions and Answers (Continued)

Q19: Appendix E says proposer is responsible for ensuring that they use the current, specified date and revision of documents in AO and DPL yet currently both Appendix E and DPL are out of date and without revisions.

A19: Yes, The DPL is presently out of date and will be updated before the AO release

Q20: Requiring proposers to allow for GI/GO seems unreasonable and unfair since NASA retains the control of the solicitation and selection.

A20: AO is being revised to require the GI/GO costs to be included in the proposal but not count against the cost cap. The program, none the less, will be required in all Discovery proposals and will be administered by NASA.

Q21: Regarding publication times: What limits should be assumed? Should additional time be added to Phase E for archival and publication?

A21: Phase E should include all data archival and publication.

Late Questions and Answers (Continued)

Q22: Does \$190M Phase C/D (L+30 days) cost cap include launch services?

A22: The \$190 million C/O cap is for S/C and instrument development. The \$299 million cap includes ELV and launch services.

Q23: Can the evaluation process be modified to allow a fairer evaluation of mature technologies being transferred from the military/black world?

A23: We do not see how, but we are open to suggestions.

Q24: The AO seems unnecessarily rigid regarding EELV's given the current state of development. Why?

A24: We are not sure what is meant by rigid, however, EELV costs and reliability are of considerable interest to Office of Space Science. Since (1) Costs are substantial, and (2) the mission success relies in a reliable launch vehicle.

Late Questions and Answers(Continued)

Q25: What part of my E/PO proposal must I submit electronically and why?

A25: The AO has been revised to make this very clear. Although, the narrative E/PO section from the proposal, the E/PO letters of commitment/support, E/PO resumes, and the top level budget showing an E/PO line remain in the hardcopy of the proposal, and will be available to the E/PO evaluators for review. Using the website, the narrative E/PO section and the supporting planning data shown in appendix c (templates 1,2 and 3) of the AO should be electronically submitted. The hard copy and the electronic submission procedures together not only facilitate the NASA review process but also allow the proposer more flexibility against the page count limit.

Q26: Sections 3.6 and 7.2 of the AO now refer to "NASA OSS Cost" whereas in prior AO's this was the "Cost to NASA". What has changed?

A26: The total cost cap for Discovery investigations (both mission investigations and Mission of Opportunity investigations) have effectively been raised by allowing all costs which are not paid by the Office of Space Science to be excluded from the cost cap if they are contributed. NASA costs by other NASA Codes other than Code S can therefore be allowed as contributions. Note, however, that as always, letters of such commitment must accompany the proposal to substantiate that these costs are in fact contributions.

Questions during Lessons Learned

Q27: Why is there a \$375K Concept Study limit when SMEX gives \$450K?

A27: The AO has been revised to provide up to \$450K for concept studies.

Q28: What is the rationale of limiting contributions?

A28: We want Discovery to remain a Code S controlled and sponsored.

Q29: Can your backup launch windows occur after 9/30/06?

A29: Yes, However, the requirements for the primary launch window remain the same.

Q30: Suppose your primary window gets better just after 9/30/06?

A30: AO says you must present a “compelling case” to launch after 9/30/06.

Q31: Explain why the AO says for a MOO NASA commitment must be by 12/31/01?

A31: If commit is not required until later, then the proposal should be proposed to the next AO.

Q32: Can the AO allow ITAR/Export discussions be allowed in a proposal appendix where it will not count against your page count limit?

A32: Yes, this is allowed.

Questions during Lessons Learned

Q33: Will the new micromissions AO include wording on secondary payloads and data buys?

A33: We don't know all the particulars yet but data buys are likely to be allowed..

Q34: Does the initiation of a new micromissions AO have any implications to current AO?

A34: Just the obvious; a small micromissions like (e.g.. one flying an Ariane V) might wait 1 year and compete with more comparative missions.

Q35: What is the evaluation criteria used for data buys?

A35: AO has been revised to clarify data buy evaluation.

Q36 : Is a rank order or weighted score from the evaluation given to selection officials?

A36: No, We will not deliver a rank order or weighted score of any sort. All evaluations for each evaluation criteria for each proposal is provided to the selection officials.

Q37: How firm is the 1/3 contribution limit?

A37: This is a approximate guideline, per AO.

Q38: What is the nature of contractor evaluator arrangements that protect proprietary information?

A38: A contractor evaluator, SAIC for example must have contract clauses and/or signed agreements requiring protect proprietary information and prohibiting future hardware contracting in the area of participation. .

Questions during Lessons Learned

Q39: How do you evaluate technology infusion with risk?

A39: These are two separate evaluation criteria. We don't mix the two and each criteria is evaluated separately by different people.

Q40: Why was the cost cap not increased in the AO for inflation and other cost growth?
This effectively limits investigation.

A40: The decision to cap is made by the Associate Administrator at Code S. It is important to realize that some growth has been allowed by allowing (1) Allowing contribution outside of Code S, and (2) the costs for the GIO/GO program do not count against the cap.

Q41: Will the new strategic plan for OSS create any disconnects in focus or direction of investigations?

A41: No major changes are expected from old to new plan. Draft plan may not be out in time for people to see it before Discovery submission.

Q42: Will the performance floor mission be evaluated as part of the science evaluation?

A42: Yes, We want to be sure that the science floor is worth doing.

Questions during Lessons Learned

Q43: The draft AO distinguishes between public info and public outreach, Please discuss?

A43: A continuum exists between education, formal or informal and the general public. Proposal's should try to do both.

Q44: EPO presentation emphasized leverage, is there a guideline here?

A44: Leverage means reaching large audience. This does not necessarily imply matching funds by participating elements.

Q45: Must proposals include costs for Discovery program reviews teams for confirmation assessment?

A45: No, The Program Office funds their own teams.

Q46: Can unspent project reserves in one phase be carried forward to the next phase?

A46: Yes

Q47: The draft NASA MOO document says to expect trade studies with SOMO during definition studies. Does this mean during concept studies?

A47: No, these will be conducted during Phase B after downselection for implementation.

Questions during Lessons Learned

- Q48:** Can the “... no exchange of funds basic” wording for the MOO be removed to allow payments to a commercial spacecraft provider?
- A48:** No exchange of funds wording applies only to MOO’s on non -domestic mission. This does not apply to domestic commercial missions. AO has been clarified.
- Q49:** Should there be reserves on ELV costs?
- A49:** Yes, we recommend reserves on all elements of the project.
- Q50:** Should costs for mission operations and communications (Space Operations and Management Office/SOMO Costs) be included in our proposal as OSS costs or may we assume they will be Code M contributions?
- A50:** The AO clearly indicates in Section 3.6.1 that all such costs including launch vehicles, launch services, and mission operations costs are to be included as costs to OSS and thus should be shown as OSS cost and will count against the cost cap.

Attachment 5

**If you would like a hard copy of Jeff Rosendhal
presentation please
Call or E-Mail**

**Chris Barnes - SAIC
(757) 827-4650
c.d.barnes@larc.nasa.gov**

Attachment 6

**Please contact John Schafer for a copy
of this presentation.**

**John Schafer
(202) 358-4621**

Attachment 7

Astromaterials Curation

Discovery Lessons Learned Workshop

23 February 2000

Eileen K. Stansbery, Ph.D.

Components of Curation

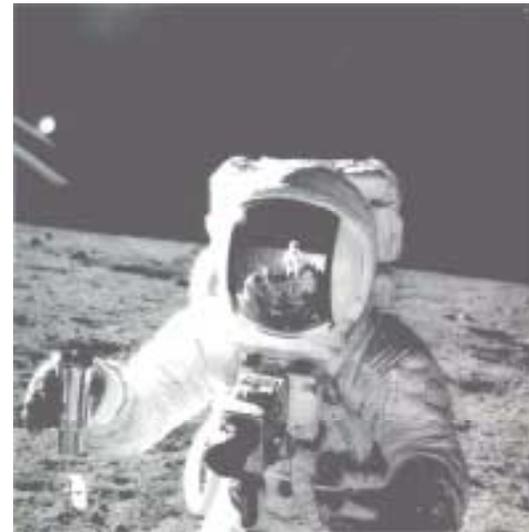
- **Protect**
 - Keep Samples Pure
 - Environment: Chemically Inert, Particle Free, Isolated & Controlled
 - Material Restrictions: Containers, Cabinets, Laboratory
 - Monitoring: Environment, Personnel, Access, Cleaning
 - Sample Control & Tracking
- **Preserve**
 - Reserve a Portion for the Future
 - New Science: Improved Analytical Techniques, New Ideas
- **Document**
 - Keep Accurate Historical Information
 - Images, Description, Weight, Orientation, Location, Handling History
 - Publish Information About Newly-Available Samples
 - Newsletters & Catalogs
 - Examine & Classify Samples
- **Distribute**
 - Peer Reviewed Allocation for Research & Education

Collections

- JSC Is NASA's Repository of Extraterrestrial Samples
 - Provide the Best Samples for the Best Scientists
- Current
 - *Apollo* Lunar Samples
 - Antarctic Meteorites
 - Cosmic Dust Collected in the Stratosphere
 - Space Exposed Hardware
- Planned
 - Genesis
 - STARDUST
 - Muses-C
 - Mars Sample Return

Apollo Lunar Samples

- 382 kg
- 2196 Original Samples
 - 70% Rocks
 - 24% Soils
 - 5% Soil Cores
- Now Subdivided Into 86,000 Samples
- 80% by Weight Remains Pristine



Antarctic Meteorites

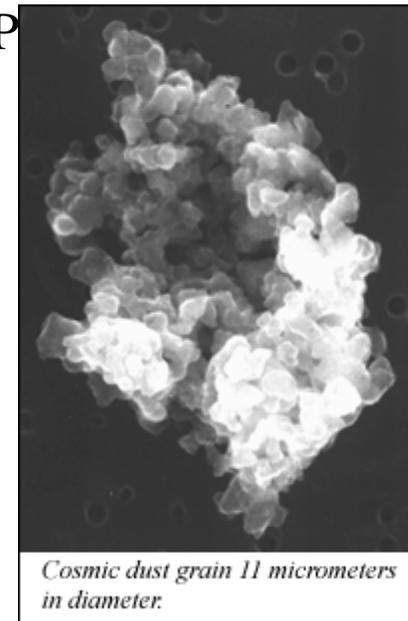
- Cooperative Effort Between NASA, NSF, and Smithsonian
- Over 8500 Specimens
- Acquire 250 to 1100 New Specimens Yearly
- Distribute ~600 Samples/year for Research

- 8 Lunar Rocks
 - 887 grams
- 5 Martian Rocks
 - 10 kg
 - 839 Samples Distributed



Cosmic Dust

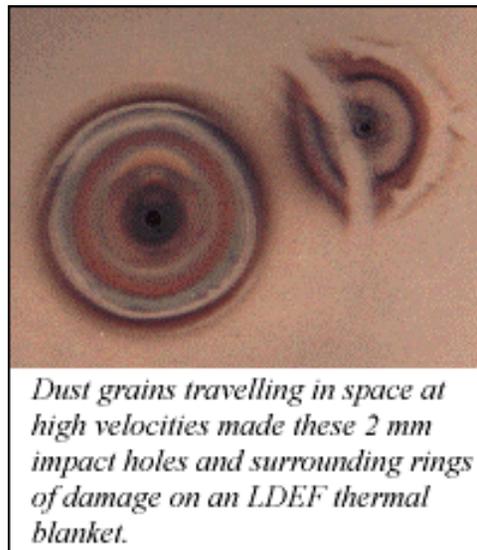
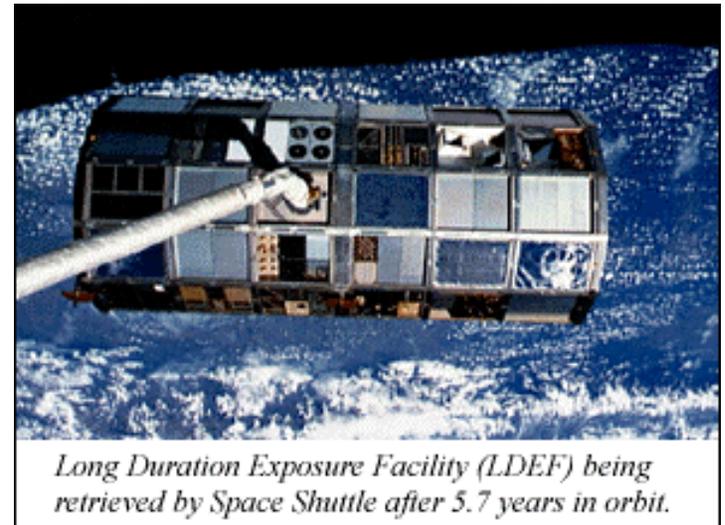
- Stratospheric Dust including Interplanetary Dust Particles
- 302 small collection surfaces
- 45 large collection surfaces
- typically 4 to 100 μm size particles



Cosmic dust grain 11 micrometers in diameter.

Space-exposed Hardware

- Over 22,000 Impact Features Mapped
 - LDEF
 - Solar Max
 - Palapa
 - Surveyor III
 - Skylab Windows



Genesis

- Samples Arrive August 2003
- Solar Wind Ions (Li to U)
 - Captured in Various Materials:
Si, Ge, Au, Al, Sapphire, CVD Diamond,
Silicon Carbide, Vitreloy
- Curation
 - Processing and Handling in Class 10 Environment
 - New Laboratory Complete
- Other Responsibilities
 - Mission Contamination Control
 - Pre-flight Canister Cleaning &
Collector Installation



STARDUST

- Samples Arrive January 2006
- Comet Coma Grains and Interstellar Dust
 - Captured in Silica Aerogel
- Curation
 - Plan for Class 10 Environment or Filtered Air Glovebox
- Other Responsibilities
 - Contamination Control



Muses-C

- Samples Arrive at Earth January 2006
 - 10% of Samples Expected in US in 2007
- Chipped Surface Samples From Near-earth Asteroid 1989ML
- Curation
 - Institute of Space and Astronautical Science (ISAS) Near Tokyo
 - Processing in Class 10 Environment
 - Plan for JSC Class 10 Environment



Mars Sample Return

- Samples Arrive 2008?
- Rock Cores and Soil
 - ~ 250g
 - 40 Cores; 2cm Diameter
 - 20 Soil/Pebble Scoops
- Curation
 - In Coordination With Quarantine
 - Requirement for Biological, Organic, Geochemical Cleanliness
- Planning & Research
 - Plan for New Planetary Sample Facility
 - Bio-geochemically Clean Handling
 - Cold Processing



Lessons From Experience

- **Curation From the Beginning – Planning Should Start With Design**
- Mission Design
 - Composition & Cleanliness of Sample Hardware
 - Sample Collection & Preservation Methods
 - In-flight Contamination
 - Return Canister Compatible With Receiving/Curation Facility
- Reference Coupons
 - Archive Flight Materials
 - Pre-flight Handling Witness Plates
- Document Handling History
 - Pre-flight Environment
 - In-flight Environment
 - Collection Context

Facilities

- Lunar Laboratory
 - Pristine Sample Vault – GN₂ Storage
 - Pristine Sample Processing Lab – GN₂ Handling
 - Used Sample Vault
 - Used Sample Processing Lab – Laminar Flow Air Handling
- Meteorite Laboratory
 - Sample Processing Lab – GN₂ Storage; GN₂ or Laminar Flow Air Handling
- Cosmic Dust Laboratory
 - Class 100 Processing Tunnel
 - Support Area – GN₂ Storage
- Genesis Laboratory
 - Class 10 Payload Assembly and Processing Lab – GN₂ Storage
 - Class 10 Ultra-precision Cleaning Lab
- Space-exposed Hardware Laboratory
 - Sample Scanning and Storage Room

Facilities (cont.)

- Common Support
 - Sample Data Storage Vault
 - Database Management and Computer Support
 - Thin Section Preparation
 - Cleanroom for Pre-cleaning Tools and Containers
 - Cleanroom for Final Cleaning Tools and Containers

Attachment 8

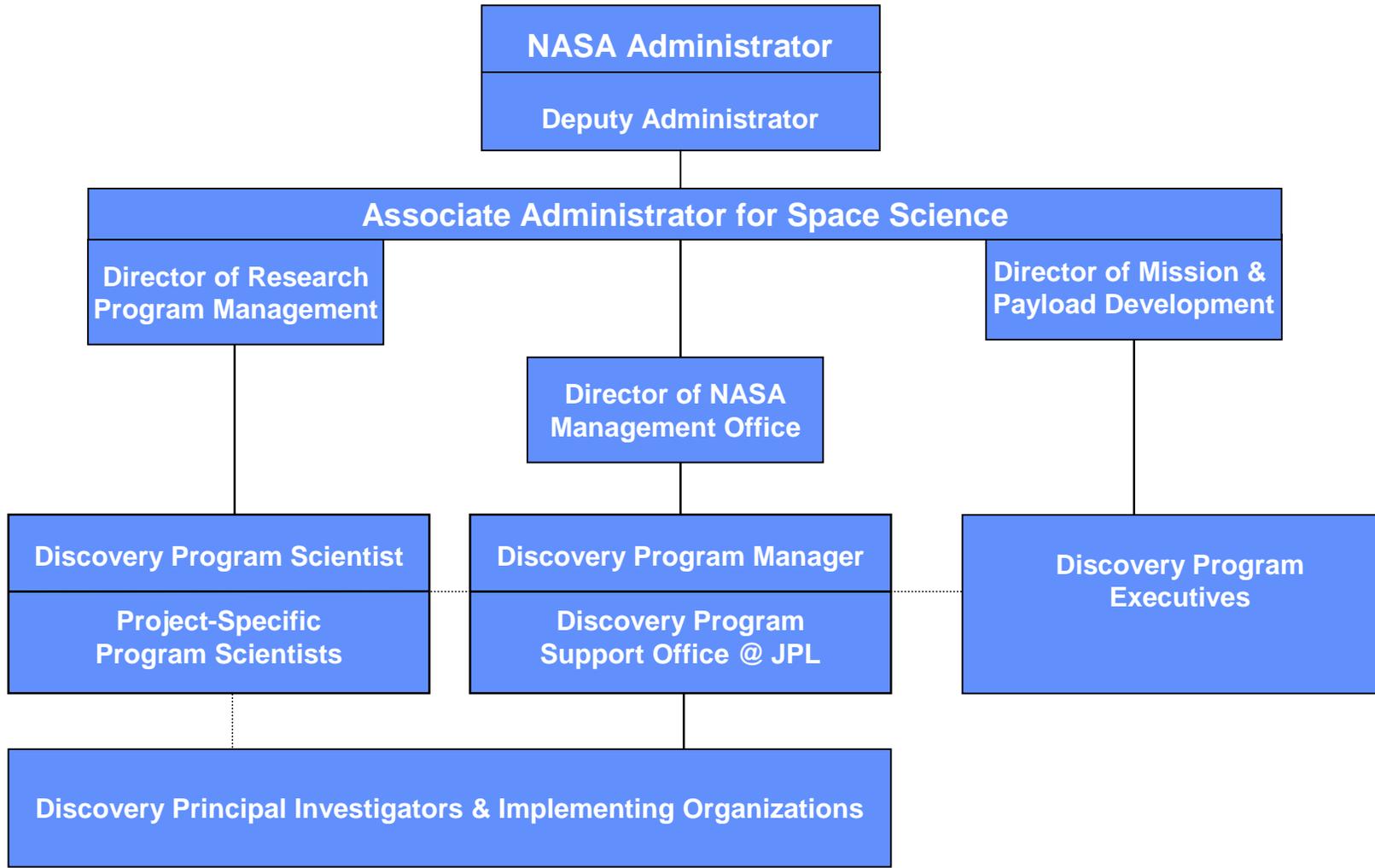
Discovery Program Office

Discovery Program Management

David B. Jarrett
Discovery Program Manager

Discovery Lessons Learned Workshop
Lunar and Planetary Institute
Houston, Texas
February 23-24, 2000

Program Organization



Program Objectives

- To accomplish frequent, high quality planetary science investigations using innovative and efficient management techniques
- To enhance our understanding of the solar system as it is today and of its formation and history
- To substantially reduce total mission cost and development time
- To enhance public awareness of, and appreciation for, space exploration

Responsibilities

- NASA Headquarters
 - scientific and strategic direction for the overall Discovery Program
- Discovery Program Office
 - day-to-day program management responsibility
- Principal Investigator
 - overall responsibility for scientific integrity, safety, and mission success

Contracts

- Concept Study Report is basis for contracts
 - Statement of Work Appendix
 - Schedule
 - Budget
- Request for Proposals still issued for procurement cost estimates
- Period of performance through end of current mission phase
- Implementation Phase funding dependent on successful Confirmation Review
- Contract options for each mission phase through end of mission operations and data analysis

Principal Investigator Contract

- Principal Investigator contract with NASA
 - Contract approved by Discovery Program Manager (Contracting Officer's Technical Representative)
 - Contract executed through NASA Headquarters Procurement Office at the Goddard Space Flight Center

Jet Propulsion Laboratory Contract

- JPL Projects funded through NASA prime contract
 - Task plan submitted by JPL Project Manager to JPL Contracts Management Office (CMO)
 - Task plan approved by PI and Discovery Program Manager; task order executed by NASA Management Office at JPL

- JPL mission design and navigation tasks funded through NASA prime contract
 - Task plan submitted by JPL task manager to JPL CMO
 - Task plan approved by Project Manager and Discovery Program Manager

Applied Physics Laboratory Contract

- APL contract with NASA
 - Task order approved by Discovery Program Manager
 - APL project is task under General Aerospace Services Contract with NASA's Goddard Space Flight Center (GSFC)

Reporting

- Problem Report requiring Program Office attention--as they occur
- Cost Control -- NASA 533's required by contract with additional monthly reporting format required by Discovery Program Office
- Weekly electronic report required during Implementation
- Monthly Management and Status Report
 - Conducted via videocon or telecon from project location
- Quarterly Management and Status Report
 - more in-depth review of project status

Report Content

- Monthly -- 30 minutes maximum
 - Significant Accomplishments/Milestones
 - Plans for Next Period
 - Cost performance - Plan versus Actual
 - Cost Variance Analysis
 - Workforce status
 - Schedules
 - PI/Project Manager Assessment
- Quarterly -- 2 hours maximum
 - Same as monthly only on an expanded basis
 - Education and Public Outreach status
 - Mission Assurance Assessment

Reviews

- Minimum Program Requirements
 - Confirmation Review (CR) Process
 - » CR conducted in conjunction with Preliminary Design Review (PDR) to confirm readiness to proceed into Implementation
 - » Independent Confirmation Assessment (CA) conducted at request of Headquarters
 - » CA results reported at Confirmation Readiness Review
 - » CR conducted at Headquarters for AA for Space Science
 - » AA for Space Science is decision authority to determine whether to authorize the project to proceed into Implementation
 - Mission Readiness Review Process
 - All other launch site safety and vehicle reviews

Program Requirements

- Project Plan
 - In accordance with NPG 7120.5
 - Concept Study Report may be used
- Risk Management Plan (can be documented as part of project plan)
- Mission-Specific Program Level Requirements Appendix
 - Mission Definition and Requirements Document in CSR used as basis
 - Appendix to the Discovery Program Plan
- Confirmation Assessment Review Data Package
- Flight Readiness Certification
- Education and Public Outreach Plan
- Technology Infusion/Transfer Plan
- SDB/Minority Institutions Subcontracting Plan

Program Controls

- Risk management tools are schedule and financial reserves as well as descoping of mission requirements above the defined performance floor
- All reserves are controlled at the Project level within the mission cost cap
- No NASA Headquarters or Discovery Program Office reserves
- Once selected, failure to maintain reasonable progress on schedule and within budget will result in a project termination review

Attachment 9

Discussion Topic for the Discovery 2000 Lessons-Learned Workshop:

“Should NASA add a new step to its Step 1 evaluation process that allows comparison of results from the current review with those of prior reviews of the same Discovery mission concept, and if so, how might such a step be implemented?”

Gregg Vane

Jet Propulsion Lab

February 2000

The Issue

- Many Discovery mission concepts are proposed more than once
- Often, the NASA evaluation of subsequent proposals of the “same” concept differ from the previous evaluation(s)
- The Issue:

How to assure that when the results are different, they are due to a change in the concept and not to the vagaries of a review board whose membership may be different from the previous board(s)?

The Challenge

- Code S has devised a generally excellent Discovery review process
 - Most proposing teams support it - it almost always yields a fair and accurate evaluation
 - The process is consistent from cycle to cycle - you can bank on it
 - The process is executed expeditiously - selections are made in a timely fashion
- The Challenge:

How to add a “cross comparison” step that

- *Is viewed as fair*
- *Is consistent from cycle to cycle*
- *Does not add huge burden to NASA in terms of workload*
- *Does not add months to the evaluation and selection process*
- *Does not violate the Federal Acquisition Regulations (FARs)*

A Notional Solution

- Step 1: Perform evaluations of proposal first, exactly as has been done in the past, without reference to prior evaluations of that proposed concept
- Step 2: The chair of the science panel and the chair of the TMC panel compare results with prior reviews
- *If the differences, if any, between current and prior reviews will not affect the category of the proposal, STOP*
 - *If differences, if any, could affect the category, go to Step 3*
- Step 3: The chair of the appropriate panel (with help as required) assesses whether the concept under current review differs from the prior proposal in ways related to the specific science or TMC evaluation area(s) in question
- *If so, STOP. Assume that the review of the current concept is at least as fair as was the review of the prior concept*
 - *If not, then NASA must adjudicate between current and prior reviews*
- Step 4: NASA Code S adjudicates between current and prior reviews, approves final evaluation results

Why Is a Solution to this Issue Important?

- Although rare, the current process can and has resulted in a widely different evaluation of essentially the same mission concept
- There are three major impacts:
 - First, it can result in the loss to NASA and the nation of an excellent mission
 - Second, when it happens, it profoundly affects the community's faith in the evaluation, selection, and debriefing process
 - Third, it is devastating to the PI and his/her team when it results in a down-grading of the proposal
- The Discovery Program is widely viewed as one of the most successful science programs in NASA's history because
 - One, it has yielded high science value for the cost, on-cost and on-schedule
 - Two, it is widely perceived by all stakeholders to be fair
- Failure to solve this issue could affect the value of the Discovery Program in the long run

Attachment 10

AO Issues from Lessons Learned Workshop

@LPI Houston, Tx 2/23/00

- 1. Funding profile too low in early years**
- 2. Cost caps need raising to accommodate inflation and other rising costs (ELV)**
- 3. Concept Study Report allowance should be raised**
- 4. ITAR reqmts should not count against page count limits.**
- 5. Recommended GI/GO level/guideline should be provided**
- 6. Trade studies with SOMO should not be required until Phase B**
- 7. Evaluation process should allow for a question and response for proposal clarifications**
- 8. Clarify evaluation criteria for data buy proposals**
- 9. Clarify whether backup launch opportunities are allowed beyond opportunity period (September 30, 2006)**
- 10. Allow project level signatures in addition to PI Institution signatures on Cover Page**