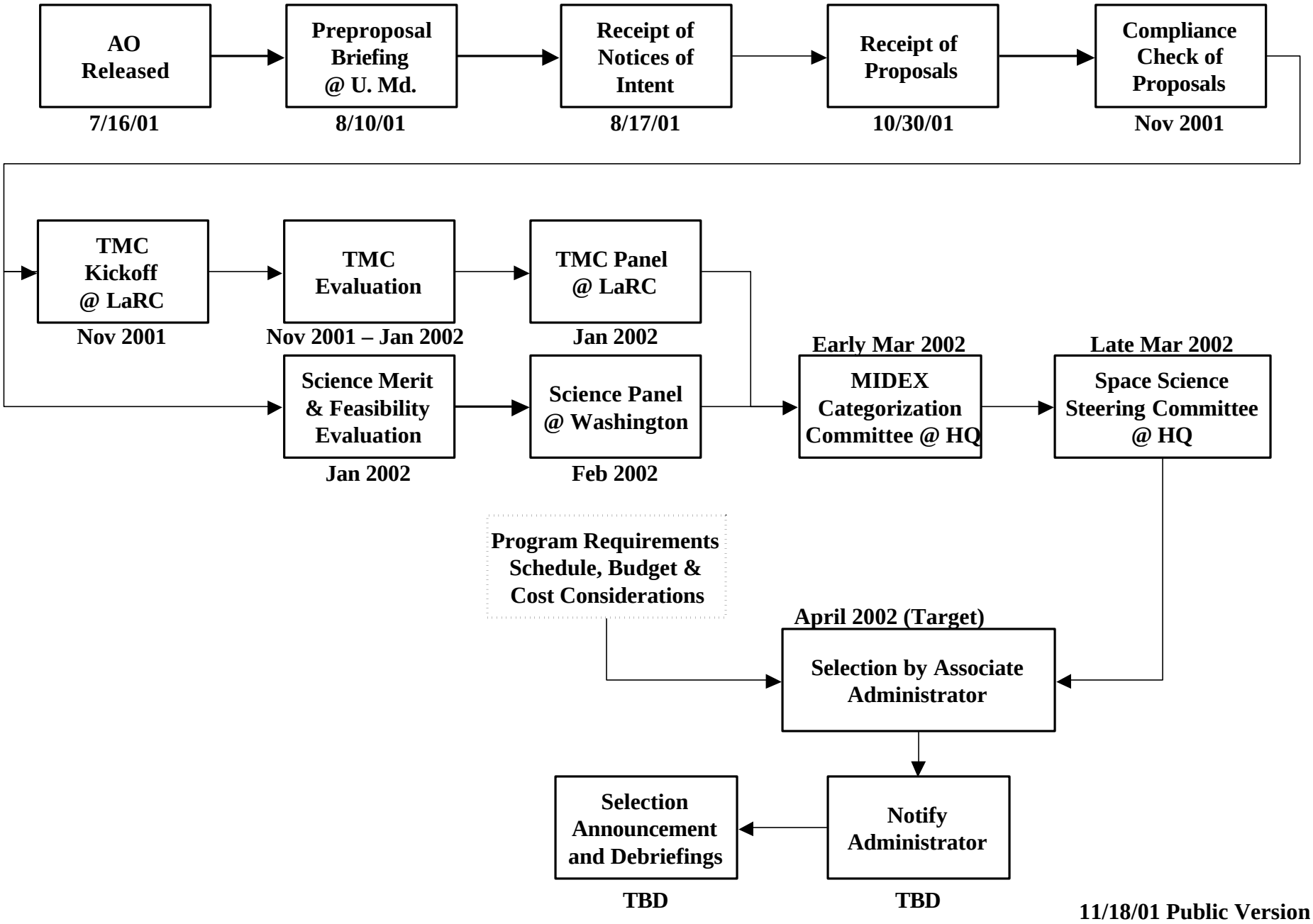
Explorer Workshop
March 12, 2002
Washington, DC

Explorer Evaluation Process I: Science

Paul Hertz
Explorer Program Scientist
Office of Space Science

MIDEX 2001 AO Evaluation Flow



11/18/01 Public Version

Evaluation Process

- Scientific/Technical Peer Panels
  - Assigned to Discipline Scientist based upon science theme designation, primary science proposed, primary science instrumentation and technology proposed
  - Panels formed with expertise in scientific topic areas and science instrumentation
  - Conflict of interest avoided
- Proposals reviewed in depth for scientific merit and technical merit/feasibility
  - Major/minor strengths and weaknesses identified and recorded
  - Evaluation criteria assigned an adjectival rating (Excellent, Very Good, Good, Fair, Poor) based on findings

Science and Technical Requirements

- Proposal must contain
  - Clearly stated relationship between the proposed scientific objectives, the anticipated data, and the instrument payload.
  - All technical aspects of the investigation from initial studies through delivery of data and scientific analysis.
  - Data plan** including appropriate period for science analysis (independent of archiving) and specification of time required for archiving appropriate data for the scientific community and the general public (justify minimum time necessary).

** Mission of Opportunity investigation team's data analysis responsibilities defined by mission sponsor.

Science and Technical Requirements

- Science Team Responsibilities
  - Initial analysis of data, delivery to an appropriate data repository, publication of scientific findings, and communication of results to the public.
  - Release data as soon as possible (after appropriate brief validation period).
  - Collect scientific, engineering, and ancillary information necessary to validate and calibrate scientific data.
  - Implement E/PO program.

Guidelines for Science Section

- Define baseline mission: discuss measurements to be taken and data to be returned, identify approach leading from data to science objectives, identify quality and quantity of data returned, explicitly describe relationship between data products and scientific objectives.
- Define Minimum Science Mission: identify minimum acceptable data and scientific return below which mission would not be worth pursuing, discuss value of Minimum Science Mission, describe descope options available (not just instruments or mission life time) and their effect on meeting science objectives.
- Identify only one Baseline and one Minimum Science Mission.

Guidelines for Science Section

- Describe science implementation, including
  - Instrumentation: describe instrumentation, criteria for selection, individual instruments and heritage, characteristics and performance, block diagrams, interfaces, etc.
  - Mission: observing strategy, spacecraft performance, mission concept, etc.
  - Data Analysis and Archiving: data reduction and analysis plan, method and format, data products, schedule to NASA archive.
  - Science Team: members, roles, responsibilities.

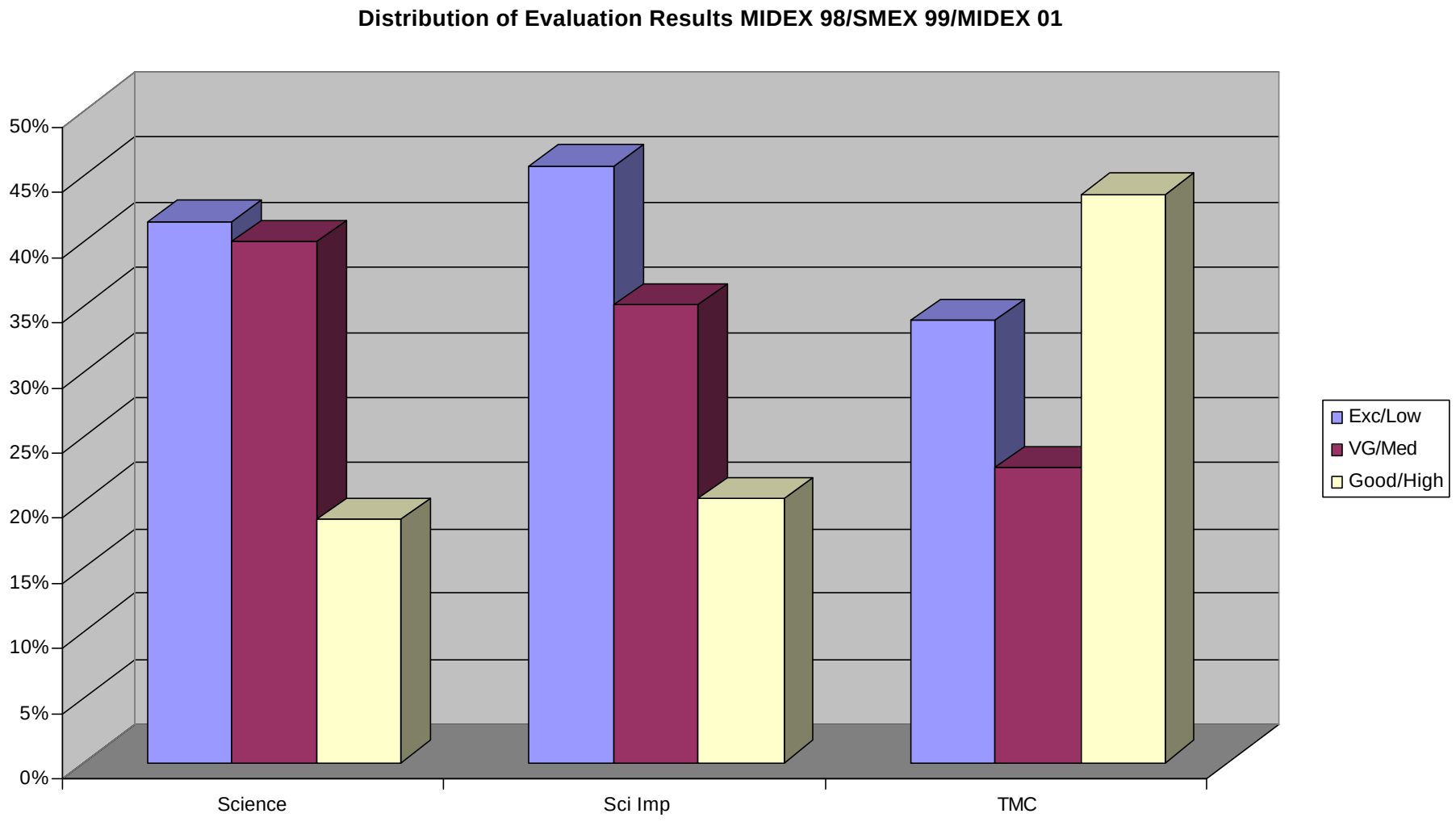
Evaluation Criteria: Scientific Merit

- To evaluate the Scientific Merit of the proposed investigation**, the following factors will be considered:
  - Impact of the investigation on Space Science and on the U.S. space science program
  - How well the investigation
    - fills gaps in the understanding of space science
    - provides progress in a NASA space science theme
    - synergistically supports ongoing space science missions
    - provides ancillary benefits to U.S. space science program
  - Adequacy of data to complete the proposed investigation
  - (MIDEX only) Scientific value of Minimum Mission.

** For a Mission of Opportunity, the proposed investigation encompasses only the contribution to the mission, not the entire mission.

Evaluation Criteria: Technical Merit and Feasibility

- To evaluate the Technical Merit and Feasibility of the investigation, the following factors will be considered:
  - Degree to which the proposed instrument(s) can be built using the proposed technologies.
  - Degree to which the proposed instrument and mission can provide the necessary data.
  - Merit of the proposed data analysis and archiving plan; merit of the proposed plan for timely release of data to the public domain.
  - Selection of appropriate science enhancement options.
  - Likelihood of success of any proposed new technology or untested advance in the state of the art.
  - Probability of success based on (i) experience, expertise, and organization of science team and on (ii) technical risk associated with mission design and instrument set.
  - Necessary contribution of each co-investigator.


Distribution of Evaluation Results MIDEX 98/SMEX 99/MIDEX 01
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Science
Sci Imp
TMC
Exc/Low
VG/Med
Good/High

Ideal Evaluation Criteria

- Science Merit

- Technical Merit

Categorization

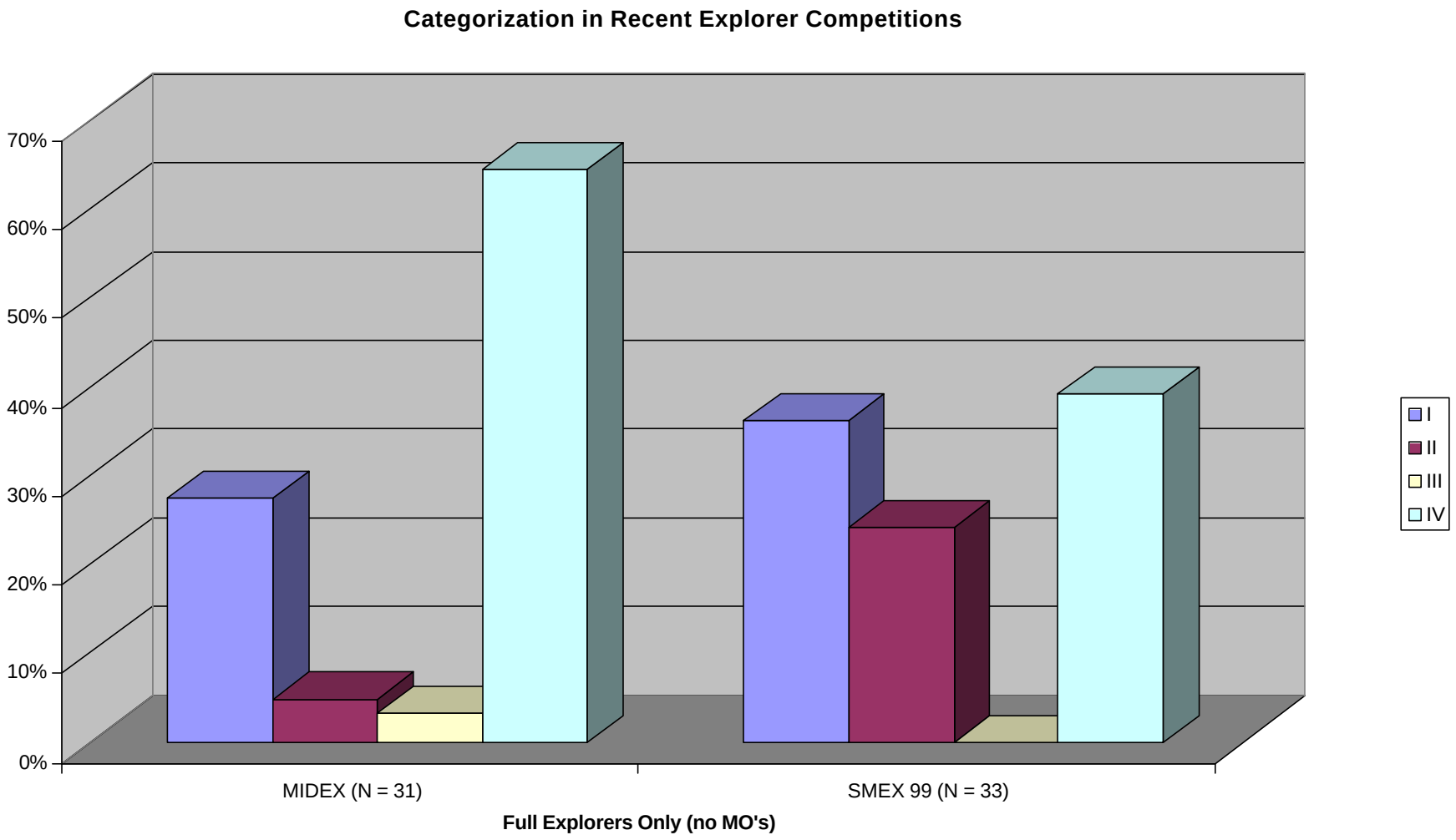
- Category I. Well conceived and scientifically and technically sound investigation pertinent to the goals of the program and the AO's objectives and offered by a competent investigator from an institution capable of supplying the necessary support to ensure that any essential flight hardware or other 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.

In response to this AO, NASA intends to select and fund only Category I investigations for flight.

Evaluation Criteria

- Scientific merit of the proposed investigation [40%]
- Technical merit and feasibility of the proposed investigation [40%]
- Feasibility of the proposed approach for mission implementation, including cost risk [20%]

  – Weights are for categorization only, not selection


Categorization in Recent Explorer Competitions
70%
60%
50%
40%
30%
20%
10%
0%
MIDEX (N = 31)
SMEX 99 (N = 33)
Full Explorers Only (no MO's)
I
II
III
IV

Selection

- Selection Factors
  - Proposal evaluations based on published criteria
  - Categorization
  - Cost to NASA OSS
- Overriding consideration: <u>Maximize scientific return within the available budget</u>
  - Space Science program is an evolving activity; selecting official will use all available science planning, policy, and cost considerations
  - Objective (not requirement) to balance among scientific themes
- Select up to four MIDEX investigations for Phase A concept studies