

# Introduction to the NRC's Decadal Surveys

Michael Moloney  
Director, Space Studies Board

# 50 Years of Decadal Surveys

- Astronomy and Astrophysics  
1963, 1973, 1982, 1991,  
2001, 2010
- Planetary Science  
2003, 2011
- Solar and Space Physics  
2003, 2012
- Earth Science and Applications  
from Space  
2007
- Life and Physical Research  
in Space  
2011



# Decadal Surveys and the NASA Authorization Acts of 2005 and 2008

## 2005

- “The Administrator shall develop a plan to guide the science programs of NASA through 2016 . . . In developing the plan . . . the Administrator shall draw on **decadal surveys** . . . developed by the [NAS/NRC].”
- “The performance of each division in the Science directorate shall be reviewed and assessed by the [NAS/NRC] at 5-year intervals.”

## 2008

- “The Administrator shall enter into agreements on a periodic basis with the [NAS/NRC] for independent assessments, also known as **decadal surveys**, to take stock of the status and opportunities for Earth and space science . . . and to recommend priorities for research and programmatic areas over the next decade.”
- “The agreement . . . shall include independent estimates of the life cycle costs and technical readiness of missions assessed in the decadal surveys whenever possible.”
- “The Administrator shall request that each [NAS/NRC] **decadal survey** committee identify any conditions or events, such as significant cost growth or scientific or technological advances, that would warrant NASA asking the [NAS/NRC] to reexamine the priorities that the decadal survey has established.”

# What is an NRC Decadal Survey?

## Purpose:

- Assess current state of knowledge in a specific discipline;
- Identify and prioritize the most important scientific questions for the next decade; and
- Prioritize the ground- and space-based missions/activities that can address these questions.

## Organization and Approach:

- Steering committee and topical panels (no two surveys are the same);
- Extensive community input via white papers, community forums, and other outreach activities; and
- **NEW** Includes independent cost and technical evaluation of proposed initiatives and recommendations made within provided budget scenarios.



# Decadal Survey General Study Process

Michael Moloney  
Director, Space Studies Board

# Caveats

- There is no such thing as a typical decadal survey
- Each and every survey since 1963 has employed a different organizational structure and study methodology
- The organizational structures and the details of the study methodology are very discipline specific.
- Nevertheless, as the following slides show, the four most recent surveys have had some similarities.

# Organization of the Earth Science and Applications from Space Decadal Survey

## Committee on Earth Science and Applications from Space

**Panel on Climate Variability and Change**

**Panel on Human Health and Security**

**Panel on Weather Science and Applications**

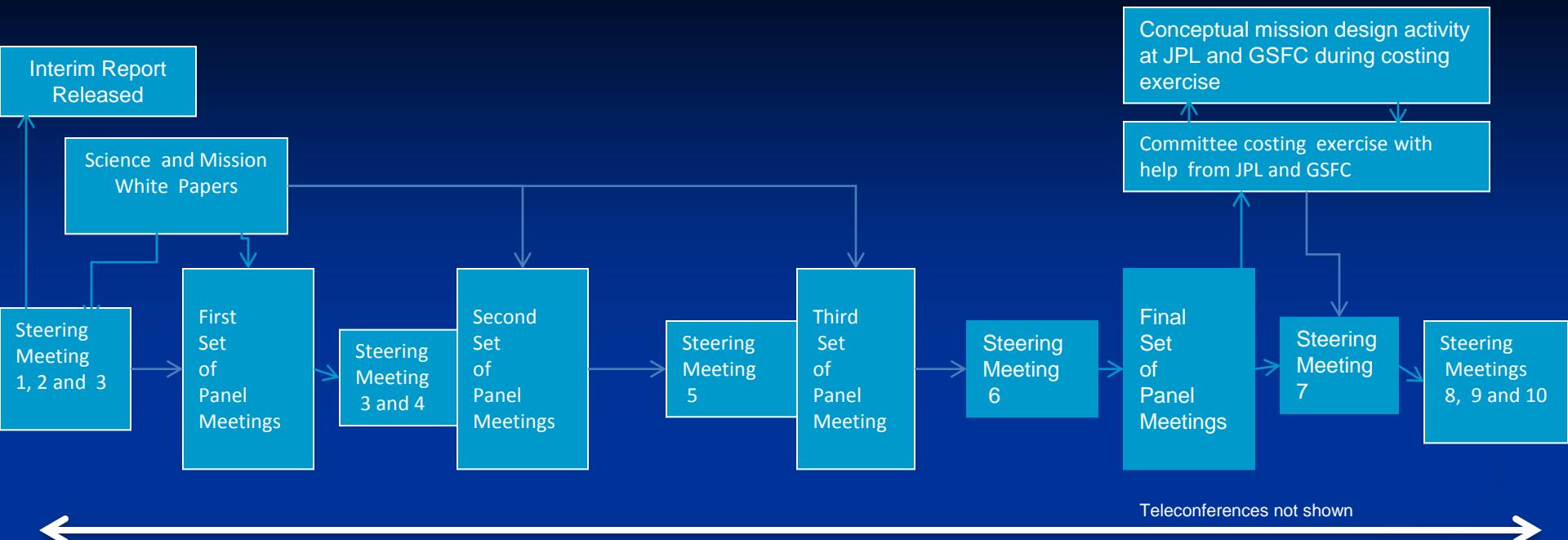
**Panel on Land-Use Change, Ecosystem Dynamics and Biodiversity**

**Panel on Earth Science Applications and Societal Benefits**

**Panel on Water Resources and the Global Hydrological Cycle**

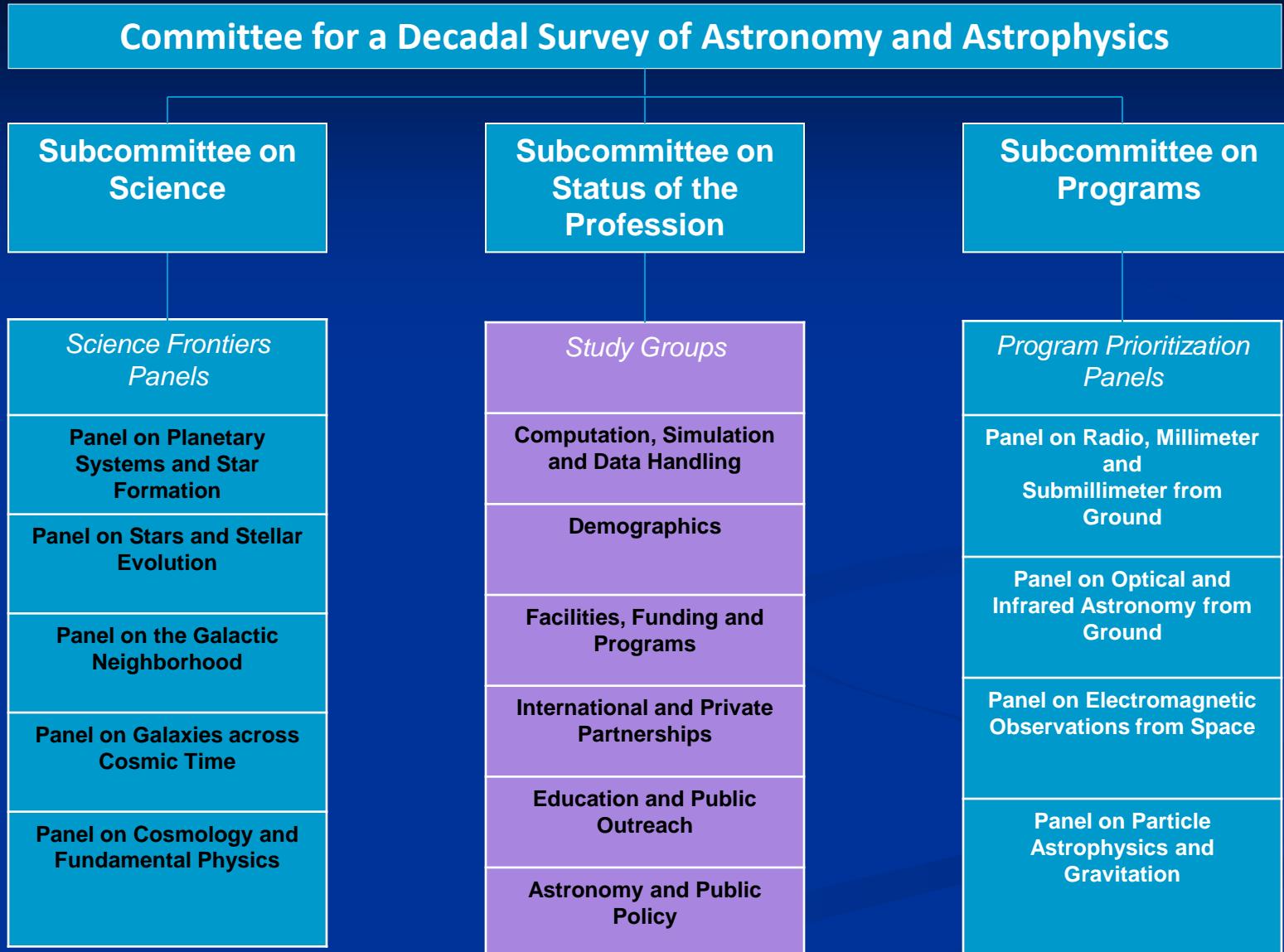
**Panel on Solid-Earth Hazards, Natural Resources and Dynamics**

# Earth Science and Applications from Space Timeline (Preliminary)

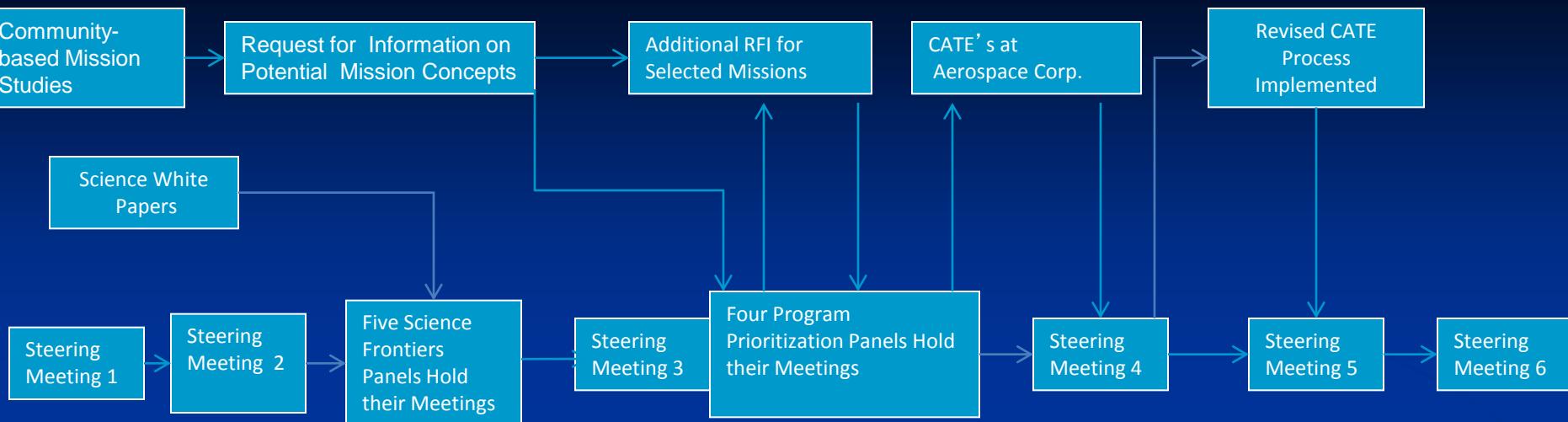


Timeline Period	Key Activities and Description
Nov. '04 - Apr. '05	Personal solicitations and a community-wide request for information released following the second meeting of the steering group leads to the generation of white papers relating to science and mission activities. An interim report is issued following the second meeting of the steering group. The first panel meetings are held.
Jul. '05 - Aug. '05	Panels and steering group meet together for the first time. Panels hear briefings, assess science and mission activities proposed in white papers and hear from the authors of selected white papers.
Oct. '05 - Nov. '05	Panel and steering group continue to meet. Assessment of white papers continue. Conceptual mission are devised.
Jan. '06 - Feb. '06	The final panel meetings are held in the Spring of 2006. NASA mission designers, assist committee in developing a budget spreadsheet to determine the likely costs of mission components (e.g., instruments, spacecraft, launch vehicle, integration and test, ground data system, mission operations, data downlink and archiving, science team, and data validation). At the seventh meeting of the steering group in May, 2006, the panels presented their prioritized missions. The steering group sets the final science and mission priorities. Three subsequent meetings are devoted to the drafting of the survey report. Report delivered to sponsors in January, 2007.
Apr. '06 - May-Sept. '06	Steering Meetings 8, 9 and 10

# Organization of the Astronomy and Astrophysics Decadal Survey



# Astronomy and Astrophysics Mission Study and CATE Timeline



Teleconferences not shown



Dec. 2008	Jan. 2008	Mar. 2009	May, 2009	Jul. 2009	Oct. 2009	Jan. 2010	Feb. 2010
Steering group's first meeting sets the survey process in motion by calling upon the community to submit white papers. In addition, a request for information is issued for potential mission concepts. Most, if not all, space concepts are derived from a pre-decadal round of NASA-funded, community-based mission studies.		The five science frontiers panels hold their meetings (three each) to identify both the scientific drivers of the field and the most promising opportunities for progress in the coming decade. These panels are instructed to avoid advocacy for particular ground- and/or space-based activities .	The four program prioritization panels begin their series of meetings (three each) by meeting jointly with the steering group to hear reports from chairs of science frontiers panels. Input from the RFI process is assessed by the panels and additional information is requested for a subset of concepts.		Program panels identify most promising ground- and space-based activities and forwards them via the steering group for study by the Aerospace CATE team. Results of the CATE studies are discussed the steering group's fourth meeting. Small modifications to the CATE process are suggested and sent to Aerospace for implementation.		Revised CATE process implemented. Results of reanalysis are discussed at the fifth meeting of steering group. Final priorities for ground- and space-based activities are devised in light of adopted budget scenarios. Report finalized at sixth meeting of steering group. Report delivered to sponsors in August, 2010.

# Organization of the Planetary Science Decadal Survey

## Steering Group of the Committee on the Planetary Science Decadal Survey

**Inner Planets  
Panel**

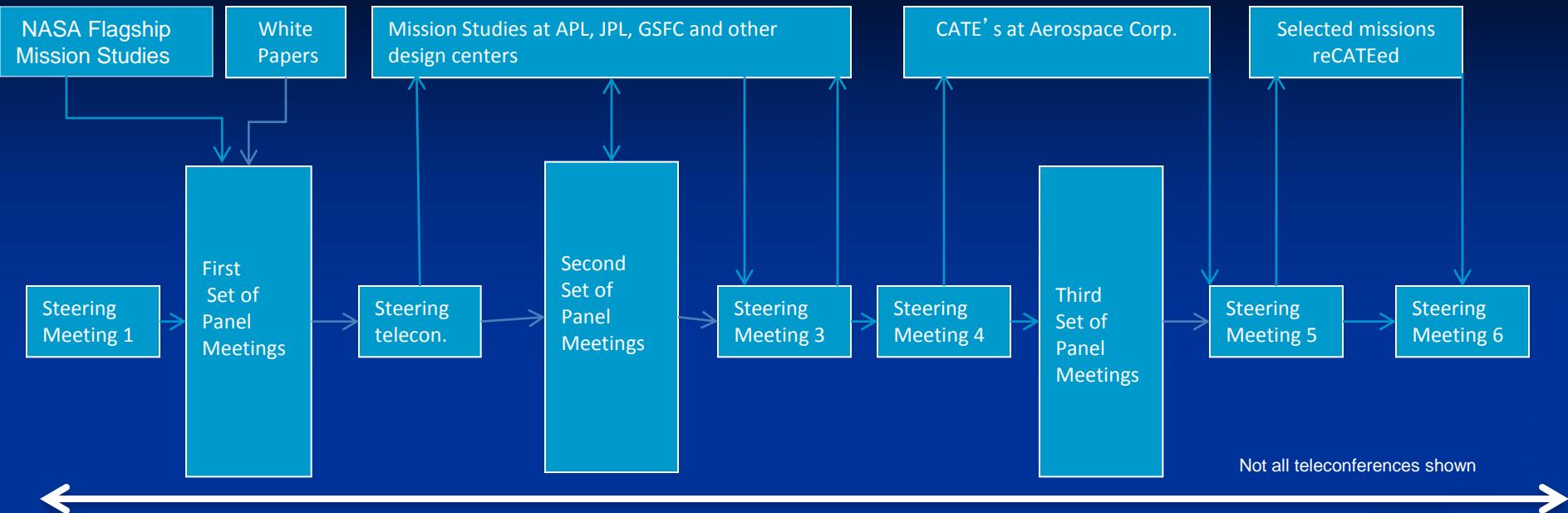
**Giant Planets  
Panel**

**Primitive Bodies  
Panel**

**Mars  
Panel**

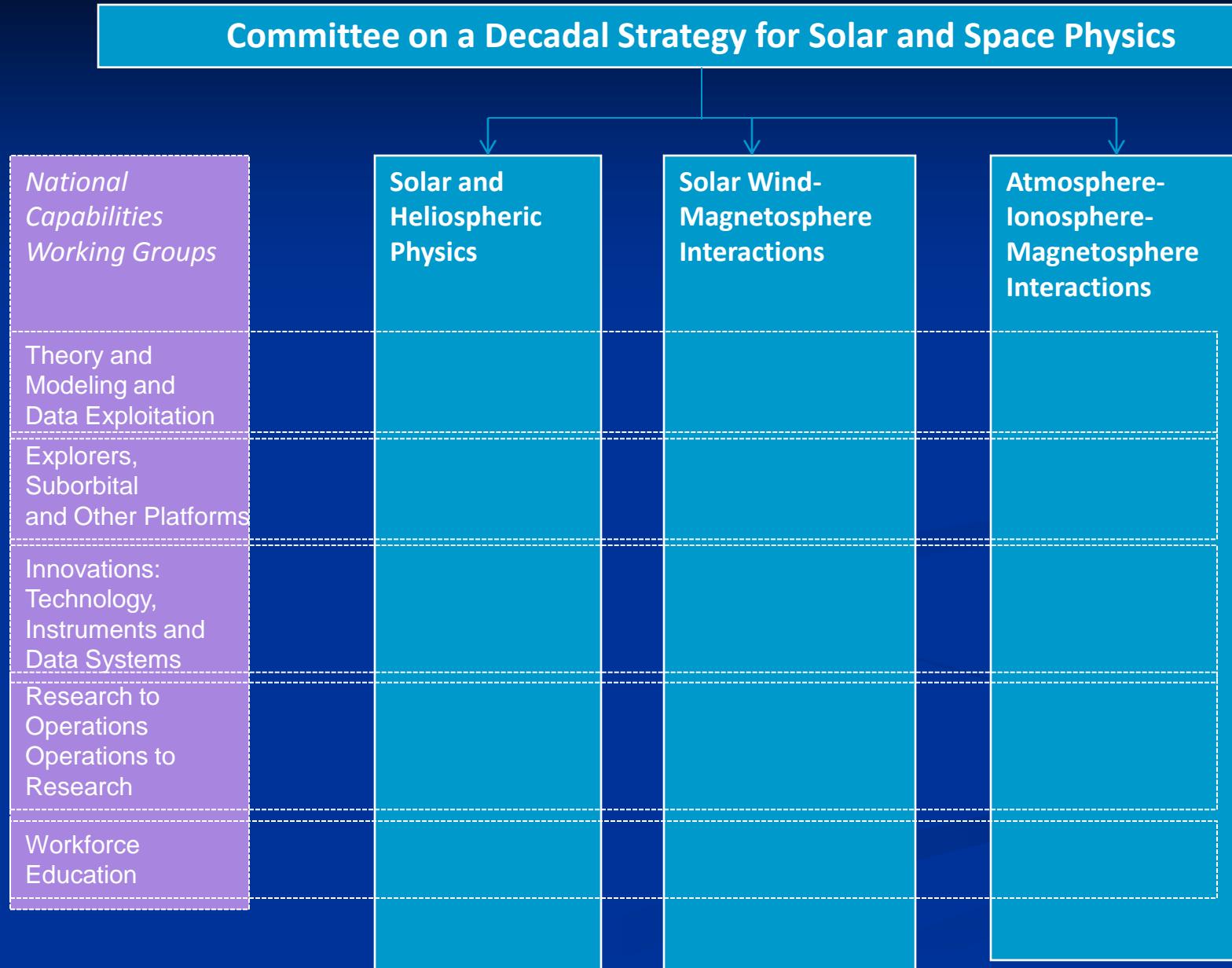
**Satellites of the  
Giant Planets  
Panel**

# Planetary Science Mission Study and CATE Timeline

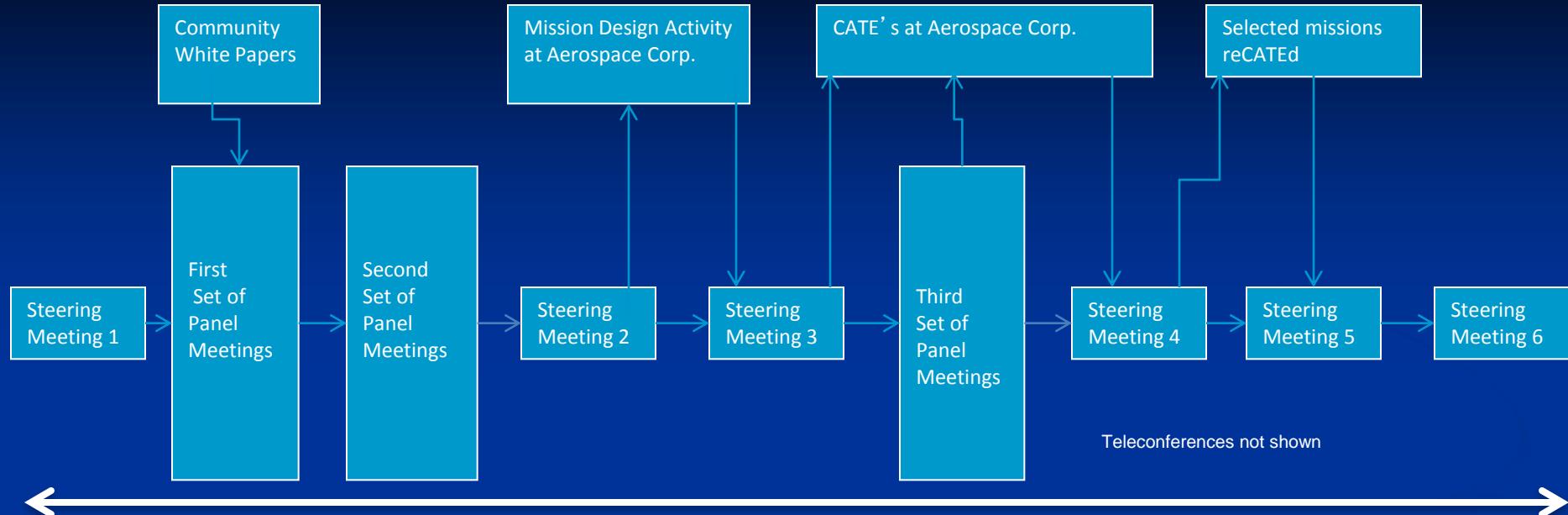


Jul. 2009	Aug. 2009	Sep. 2009	Oct. 2009	Nov. 2009	Feb. 2010	Apr. 2010	Jul. 2010	Aug. 2010
Panels formulate science goals and begin to define potential mission concepts based upon prior NASA-planning activities and community white papers. Advocates for key mission concepts and other activities invited to make presentations at panel meetings.	Panels nominate most promising mission concepts for technical studies at design centers. Panel-appointed "science champions" work with each design team to ensure fidelity to science goals of each mission concept. In some cases, rapid mission architecture studies are followed by more detailed point-design studies.	Mission design reports inform panels as to the technical realism and likely cost of initial list of priority mission concepts. Panels down-select missions and report back to steering group.	Panel-nominated mission concepts are assessed by the steering group and most if not all were forwarded to the Aerospace Corp. for independent cost and technical evaluation. When in doubt, the steering group deferred to the panels as to the relative priorities within the respective panels areas of responsibility.	Results of Aerospace's CATEs are briefed to the steering group and the CATE reports are forwarded to their respective nominating panels. In two cases, CATEd missions were descoped by their nominating panel and re-CATEed. The steering group determines the relative priorities between the panel-nominated missions.				

# Organization of the Solar and Space Physics Decadal Survey



# Solar and Space Physics Mission Study and CATE Timeline



Sept, 2010      Nov, 2010

**Steering group holds first meeting and sets the survey process in motion.**

**Panels hold their first meetings and begin to review white papers and formulate science goals and notional missions.**

**Steering group has a liaison member on each panel. Formulation of notional mission concepts completed at second set of panel meetings**

Panel chairs present science goals and a total of 12 mission concepts at second meeting of steering group. The latter forwarded the 12 notional missions for mission design activities at the Aerospace Corp. Mission champions from the panels assist Aerospace design teams (firewalled from CATE team).

At third steering group meeting, panel chairs present refined notional mission science summaries. Aerospace presents the results of their mission design activities. Six of the 12 missions studied were then selected for evaluation by the Aerospace Corp.'s CATE team (firewalled from mission-design team).

June, 2011 A  
hold last meetings  
ze discipline  
priorities. Panel  
priorities and  
of the CATE  
s are discussed by  
ering group. Two  
n concepts are  
d and sent to  
ace Corp. for re-  
on.

Refined CATE results for two mission concepts are discussed at the fifth meeting of steering group. Final science priorities and budget scenarios discussed. Report finalized at sixth meeting of steering group. Report delivered to sponsors in July, 2012.