

# Space Science Decadal Surveys: Origin, Organizations and Outcomes

Presentation to OPAG  
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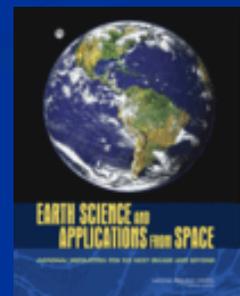
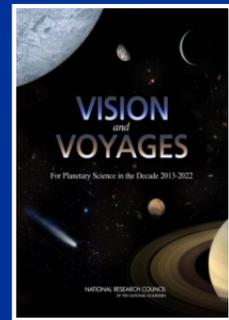
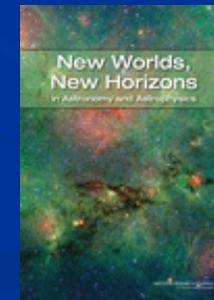
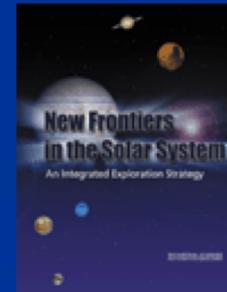
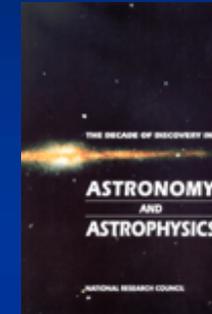
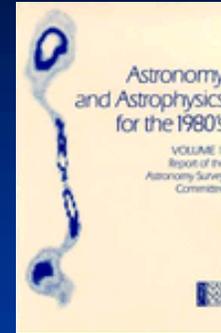
# National Academy of Sciences



The National Academy of Sciences was signed into being by President Abraham Lincoln on March 3, 1863, at the height of the U.S. Civil War. It is a private, self-perpetuating, society of distinguished scientists. But, its Act of Incorporation, mandates it to "investigate, examine, experiment, and report upon any subject of science or art" when asked to do so by any department of the government.

# Space Science Decadal Surveys

- Astronomy and Astrophysics  
1963, 1973, 1982, 1991,  
2001, 2010, (2020)
- Planetary Science  
2003, 2011, (2022)
- Solar and Space Physics  
2003, 2012, (2024)
- Earth Science and Applications  
from Space  
2007, 2018, (2029)
- Biological and Physical Research in  
Space  
2011, (2022)



# What is a Decadal Survey?

- Assess the current status of an entire scientific discipline
- Defines and prioritizes the key scientific questions that could potentially be addressed in the next decade
- Defines and prioritizes the most important initiatives that might be undertaken to address the most important questions
- Are conducted independently of sponsoring agencies and organizations by the National Academies
- NASA is legally required by language in Authorization Acts of 2005 and 2008 to engage with the National Academies and conduct decadal surveys in all major space science disciplines

# How is a Survey Conducted?

- A large group of experts selected and appointed by the national Academies—typically a steering group in overall charge and a series of supporting panels
- Specific actions taken to engage the community — community consensus is achieved via a host of outreach (white papers, workshops, town halls, etc.)
- A rigorous review conducted by outside experts selected by the National Academies
- An independent assessment of the technical, fiscal, and schedule realism of ground- and space-based facilities recommended

# Survey's Goals

- The decadal survey process is aimed at articulating a program for the coming decade that represents as fully as possible the true consensus view of the relevant US space science community.
- The distinguishing features of the decadal survey process are inclusiveness and transparency
- In contrast to past decadal surveys, post-2009 surveys place a very strong emphasis on cost and technical realism
- Community participation in all aspects of the decadal survey was strongly encouraged

# Typical Ground Rules

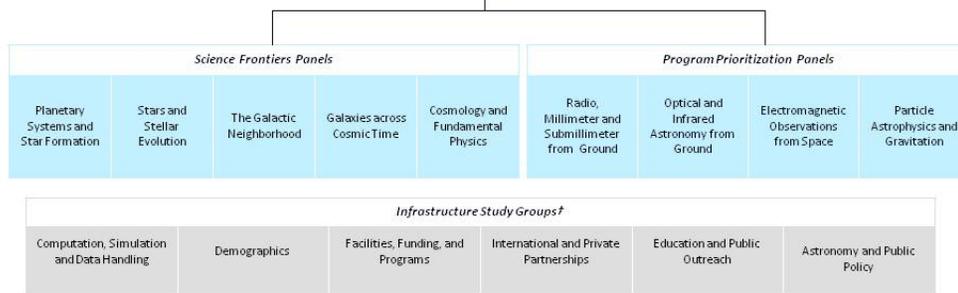
- Only missions that have a formal budgetary new start are assumed *a priori* to be part of the decadal plan (i.e., not reprioritized)
- Surveys do not, in general, prioritize small missions (e.g., SMEX, MIDEX, Discovery, Venture....) or R&A-type activities
- Missions that have been extensively discussed and studied but do not yet have a new start (e.g., MSR, Europa Lander, LUVOIR, HabEX...) are “on the table”
- Sponsoring Agencies and Congress views Surveys as the formal statement of priority by the US space science community, and have repeatedly stated their intent to give highest priority to the missions identified in the survey.

# Typical Elements of a Survey Report

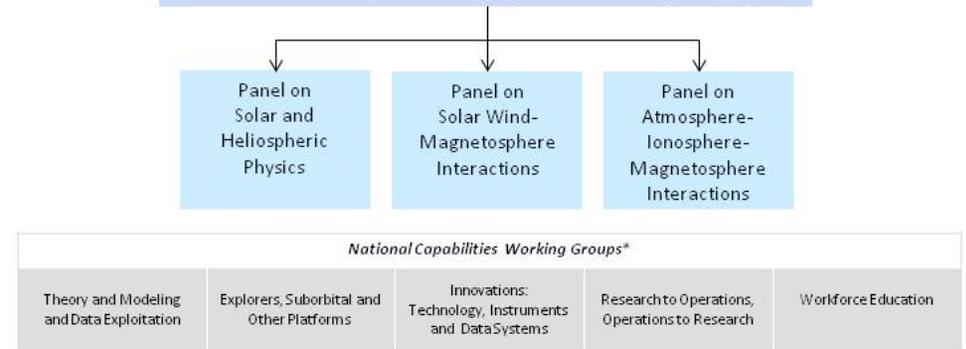
- Overview of relevant discipline
- Broad survey of the current state of knowledge
- Inventory of the top-level science questions
- Recommendations on optimum balance between
  - large / medium / small missions, ground versus space, etc.
- Assessment of infrastructure
- Discussion of strategic technology development needs
- Prioritized list of recommended strategic space missions, ground-based facilities and supporting research

# No Two Surveys Are the Same

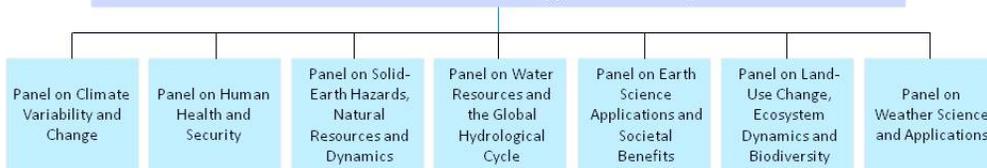
## Committee for a Decadal Survey of Astronomy and Astrophysics\*



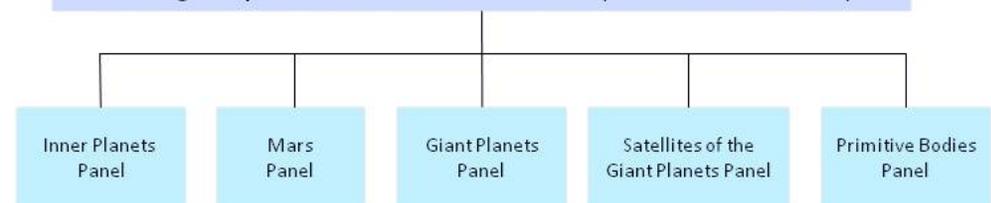
## Committee on a Decadal Strategy for Solar and Space Physics



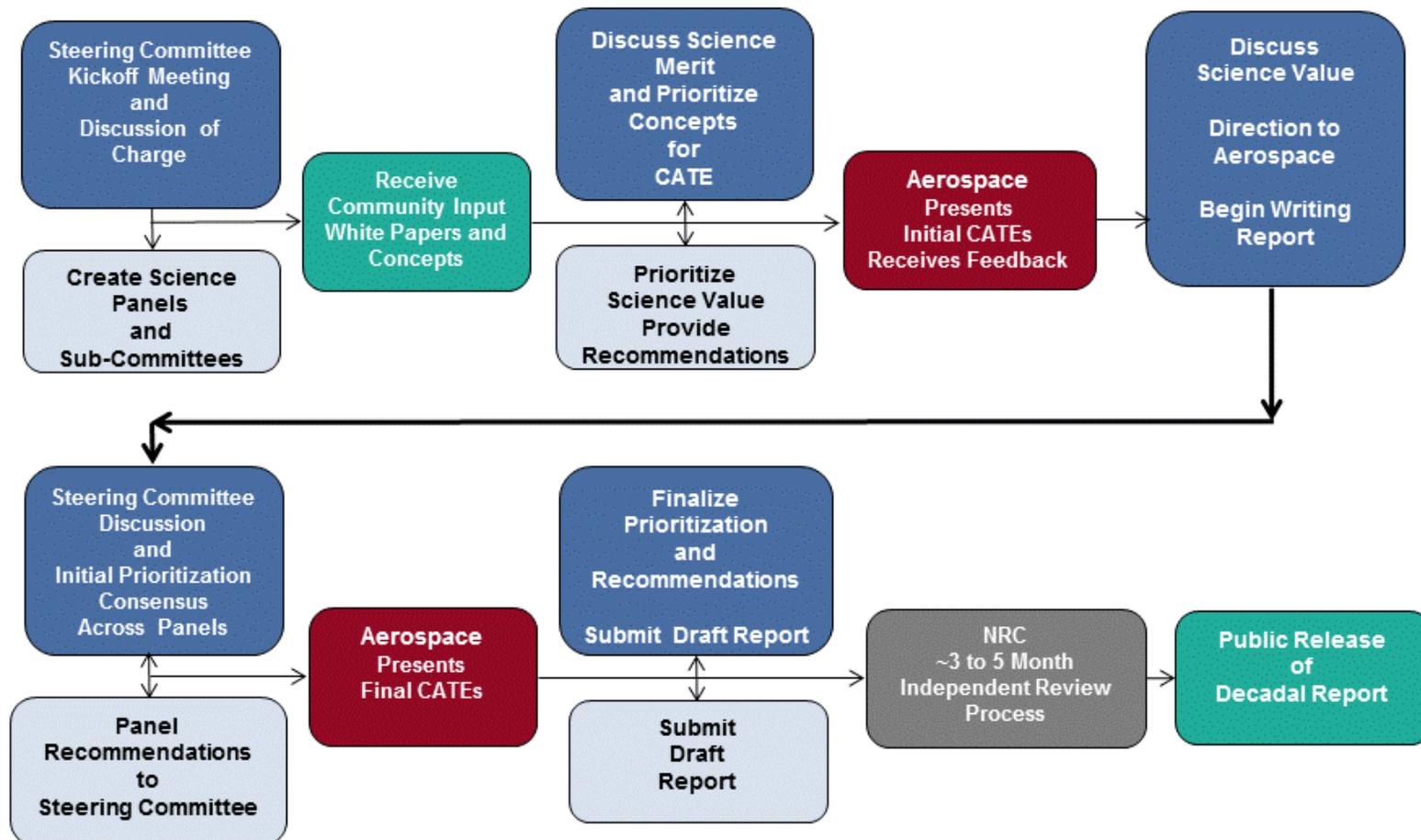
## Committee on Earth Science and Applications from Space



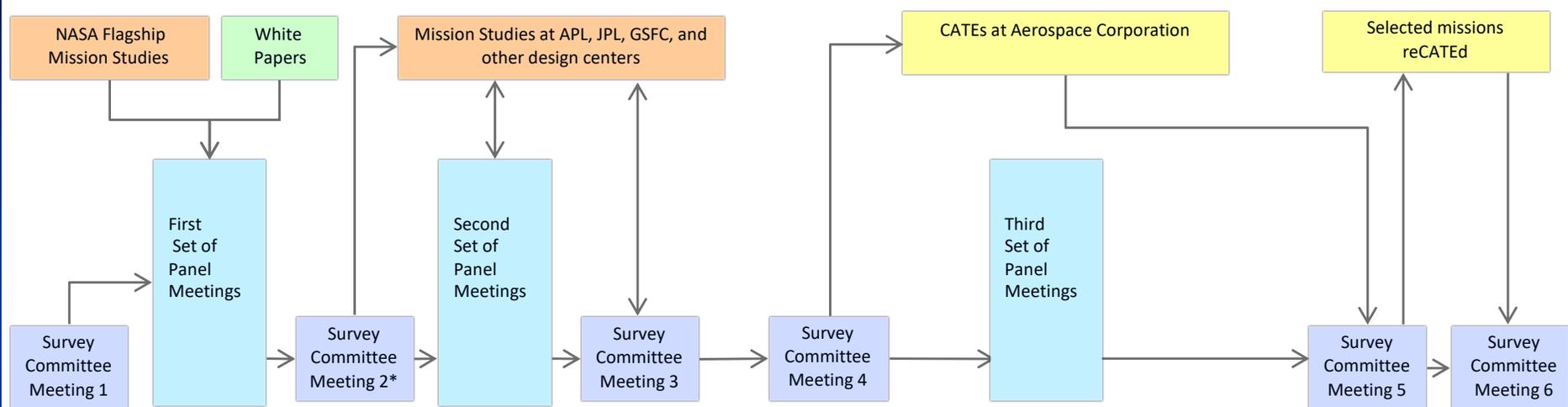
## Steering Group of the Committee on the Planetary Science Decadal Survey



# Steps in a Typical Survey



# Planetary Science 2011 Timeline



July 2009	August 2009	September 2009	October 2009	November 2009	December 2009	January 2010	February 2010	March 2010	April 2010	May 2010	June 2010	July 2010	August 2010	September 2010
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Months														

Panels formulate science goals and begin to define potential mission concepts based on prior NASA-planning activities and community white papers. Advocates for key mission concepts and other activities are 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 their design team to ensure fidelity to the science goals of each mission concept. In some cases, rapid mission architecture studies are followed by more detailed point-design studies.

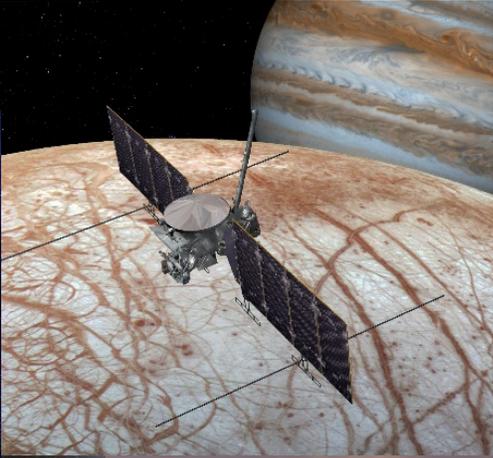
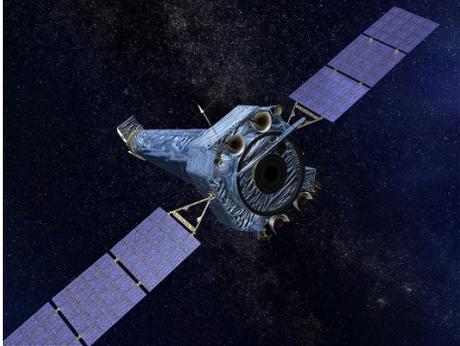
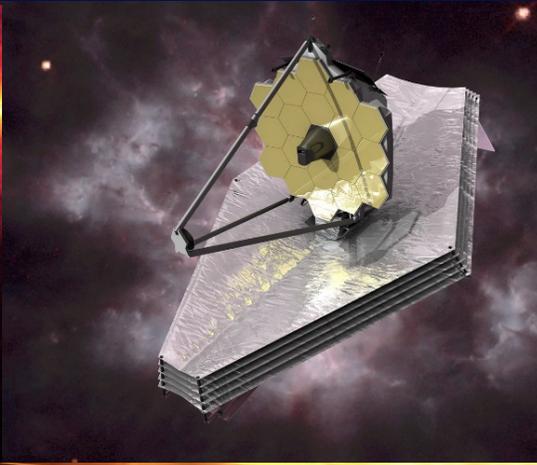
Mission design reports inform panels as to the technical realism and likely cost of the initial list of priority mission concepts. Panels down-select missions and report back to survey committee.

Panel-nominated mission concepts are assessed by the survey committee, and most, if not all, were forwarded to Aerospace Corporation for independent cost and technical evaluation (CATE). When in doubt, the survey committee deferred to the panels as to the relative priorities within the respective panels areas of responsibility.

Results of Aerospace Corporation's CATEs are briefed to the survey committee, and the CATE reports are forwarded to their respective nominating panels. In two cases, CATED missions were descoped by their nominating panel and re-CATED. The survey committee determined the relative priorities between the panel-nominated missions.

Note: Teleconferences not shown.

# Outcomes



# Thank You

Additional information about the Space Studies Board's  
Space Science Decadal Survey can be found at:

[http://sites.nationalacademies.org/SSB/SSB\\_052297](http://sites.nationalacademies.org/SSB/SSB_052297)

Visions & Voyages can be found at:

<https://www.nap.edu/catalog/13117/vision-and-voyages-for-planetary-science-in-the-decade-2013-2022>

Committee on Astrobiology and Planetary Science

[http://sites.nationalacademies.org/SSB/SSB\\_067577](http://sites.nationalacademies.org/SSB/SSB_067577)

Backup

# V&V Key Events 2008-2009

2008

4<sup>th</sup> Quarter  
Informal request received  
NRC approves initiation,  
Formal request received  
Proposal to NASA

2009

1<sup>st</sup> Quarter  
Funding received  
Chair identified  
Chair and vice chair appointed

2<sup>nd</sup> Quarter  
Steering Group appointed  
Panels Appointed

3<sup>rd</sup> Quarter  
Meetings of the Steering Group and Panels begin

4<sup>th</sup> Quarter  
Panels' period of peak active  
Mission Studies Begin,  
Contract with Independent Cost Estimator