The National Academies of SCIENCES ENGINEERING MEDICINE

Overview of the National Academies of Sciences Decadal Survey Process

COLLEEN N HARTMAN

DIRECTOR, SPACE STUDIES BOARD

U.S. NATIONAL ACADEMY OF SCIENCE, ENGINEERING, AND MEDICINE

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National Academy of Sciences

On March 3, 1863 at the height of the US Civil War, President Abraham Lincoln signed an Act of Congress to create the NAS.

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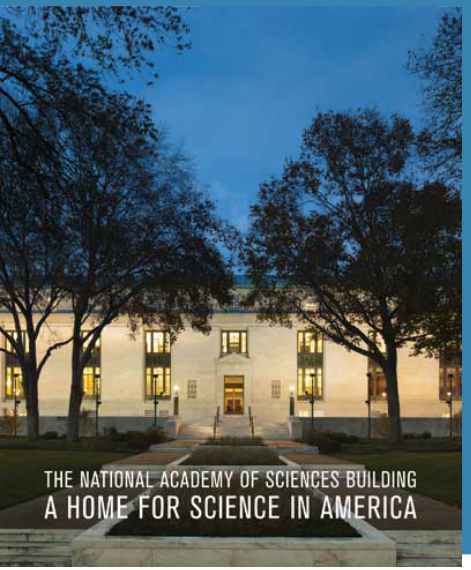
1961 SSB letter to Jim Web

"... the primary scientific goals of this program are immense: a better understanding of the origins of the solar system & the universe, the investigation of the existence of life on other planets, & potentially, an understanding of the origin of life itself."



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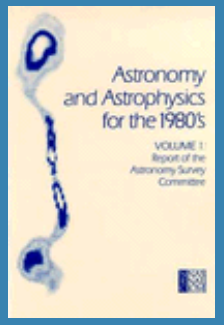
ASTRONOMY AND ASTROPHYSICS
1963, 1973, 1982, 1991,
2001, 2010, (2020)

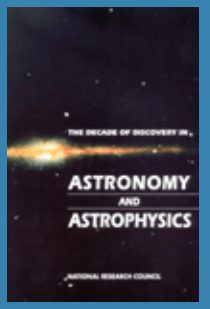
PLANETARY SCIENCE
2003, 2011, (2022)

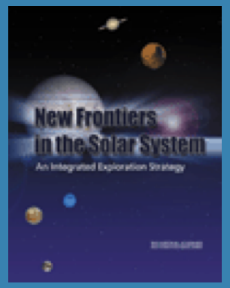
SOLAR AND SPACE PHYSICS
2003, 2012, (2024)

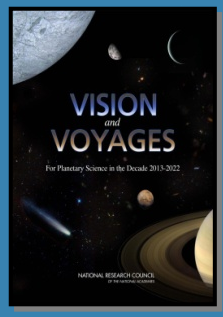
EARTH SCIENCE AND APPLICATIONS FROM SPACE
2007, 2018, (2029)

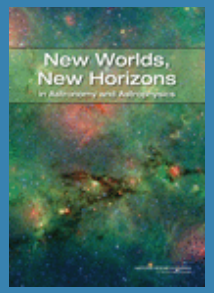
BIOLOGICAL AND PHYSICAL RESEARCH IN SPACE
2011, (2022)

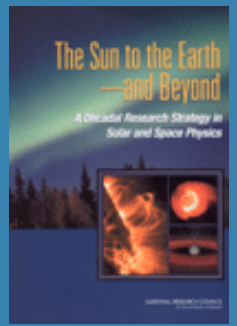


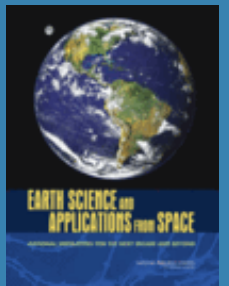












Decadal Survey Schedule (CY)

Astronomy and Astrophysics
2016 August: 2010 Midterm Delivered to Sponsors
2018 November: Decadal 2020 Task Starts
ASTRO2020 is underway!
2020 Jan 2021 Decadal 2020 Delivered to Sponsors

Solar and Space Physics
2018 July: Midterm Task Starts
2019 2nd half: Midterm Delivered to Sponsors
2022 1st half: Decadal 2024 Task Starts
2024 1st half: Decadal 2024 Delivered to Sponsors

Biological and Physical Sciences
2017 December: Midterm Delivered to Sponsor
2019 2nd half: Decadal Task Starts
2022 1st half: Decadal Delivered to Sponsors

Earth Science and Applications from Space
2017 December: Decadal 2017 Delivered
2022 2nd half: 2017 Midterm Task Starts
2023 2nd half: 2017 Midterm Delivered to Sponsors
2025 1st half: Decadal 2027 Task Starts

Planetary Sciences
2018 July: Midterm Delivered to Sponsors
2020 1st half: Decadal 2022 Task Starts
2022 1st half: Decadal 2022 Delivered to Sponsors

Typical Elements of a DS

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

Past Ground Rules

- Everything without a budget line was within scope for prioritization.
- Missions that had been extensively discussed and studied but not yet in Phase A (*e.g.*, EJSM, TSSM, Venus Flagship) were included for prioritization.
- Surveys have not usually prioritized small missions (e.g., Discovery-class or smaller) or R&A-type activities.

Technical, Risk, and Cost Estimation (TRACE)

- Independent evaluation of concepts - assuring the analysis is fair, uniform, and tied to historical data to assure accuracy.
- Puts pre-phase A concepts on even footing by evaluating them with whatever information is available and describing the resultant approximation of rough life-cycle cost of a proposed concept.

RISK Box - expand & contract the error box commensurate with available info.

Engaging with the Science Community

- Call for Science white papers
- Call for Program white papers
- Town halls, webinars, etc.
- Connecting with different audiences
- Ongoing Outreach and Communications

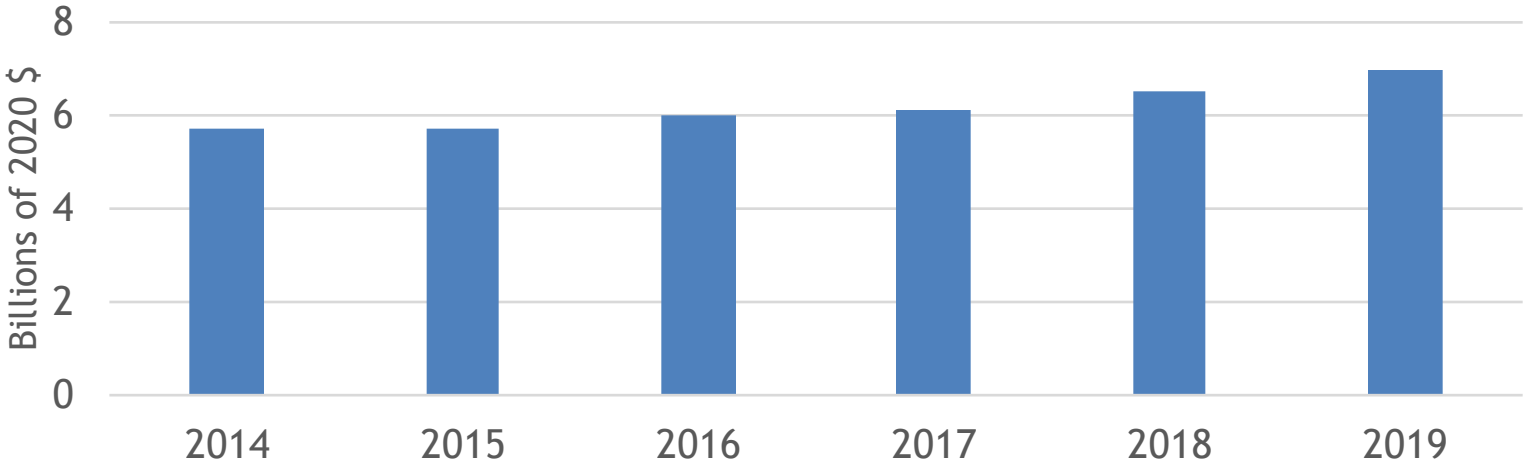
The Gold Standard
Committees meet the following criteria:

(1) an appropriate range of expertise for the task;

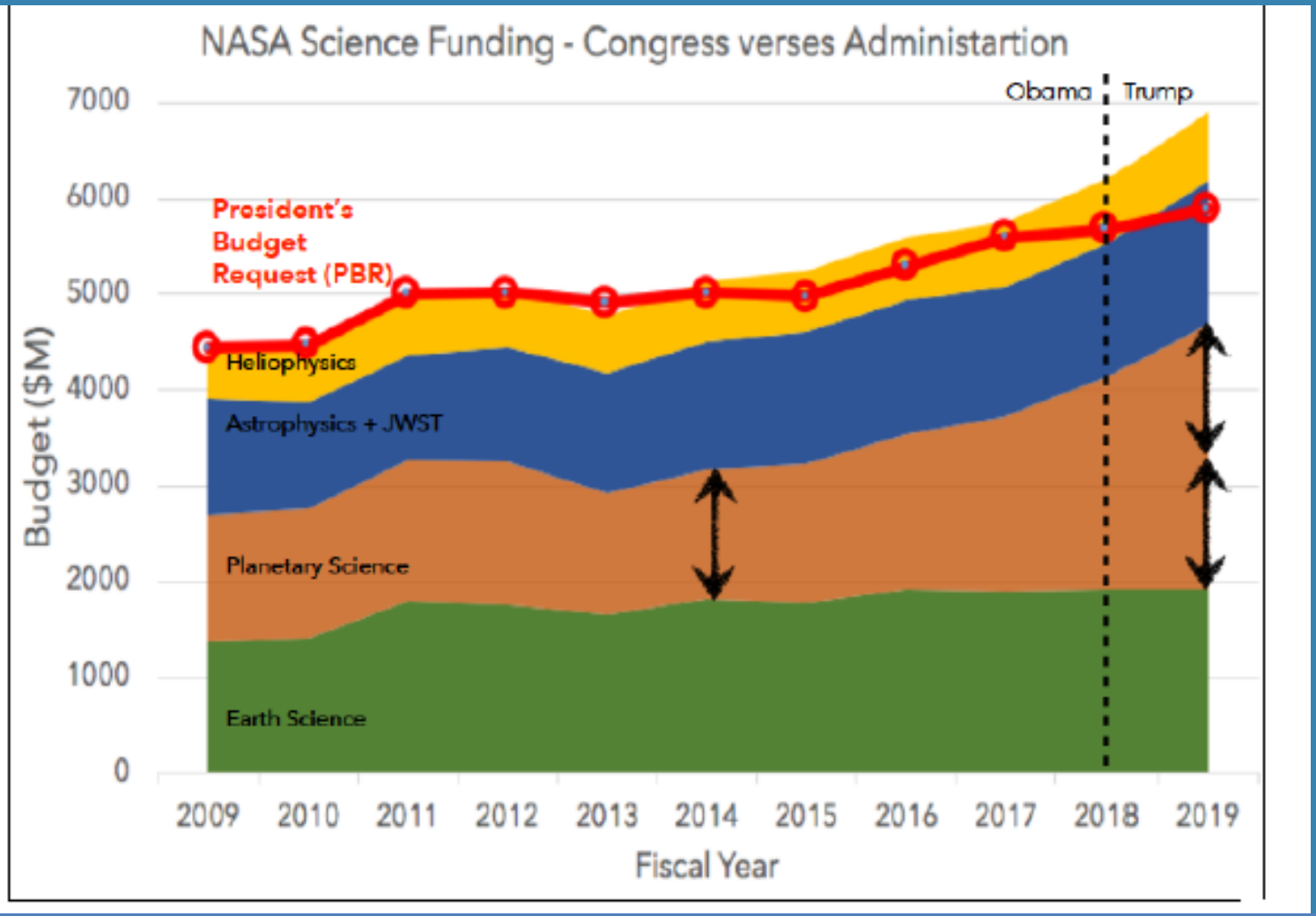
(2) a balance of perspectives;

(3) screened for conflicts of interest.

Hundreds of volunteers participate, on the SC, science panels and program panels and participating via White Papers, Town Halls, etc.


SMD Funding in Billions
FY 2020 $
Billions of 2020 $
8
6
4
2
0
2014
2015
2016
2017
2018
2019


KEY SCIENCE
THEMES
Protect & Improve
Life on Earth
Search for
Life Elsewhere
Discover Secrets
of the Universe



Annual Congressional Funding
NASA SMD


Astro 2020
Decadal Survey on Astronomy and Astrophysics
Funded (but results not controlled) by NASA, NSF, DOE/Div. High Energy Physics, and Air Force/Office of Science Research
The National Academies of
SCIENCES
ENGINEERING
MEDICINE
nas.edu/astro2020

Astro2020 Steering Committee Membership

Fiona A. Harrison, Co-Chair
California Institute of Technology

Robert C. Kennicutt, Jr., Co-Chair
University of Arizona and Texas A&M

Julianne Dalcanton
University of Washington

Pieter van Dokkum
Yale University

Andrew S. Driesman
Johns Hopkins University Applied Physics Laboratory

Jonathan J. Fortney
University of California, Santa Cruz

Gabriela González
Louisiana State University

Jordan A. Goodman
University of Maryland

Marc P. Kamionkowski
Johns Hopkins University

Bruce A. Macintosh
Stanford University

Jacobus M. Oschmann
International Society for Optics and Photonics (SPIE)

Rachel A. Osten
Space Telescope Science Institute

Lyman A. Page, Jr.
Princeton University

Eliot Quataert
University of California, Berkeley

Wanda A. Sigur
Lockheed Martin, Retired

Rachel Somerville
Flatiron Institute/Rutgers University

Keivan G. Stassun
Vanderbilt University

Jean L. Turner
University of California, Los Angeles

Tim de Zeeuw
Leiden University

Ellen G. Zweibel
University of Wisconsin, Madison

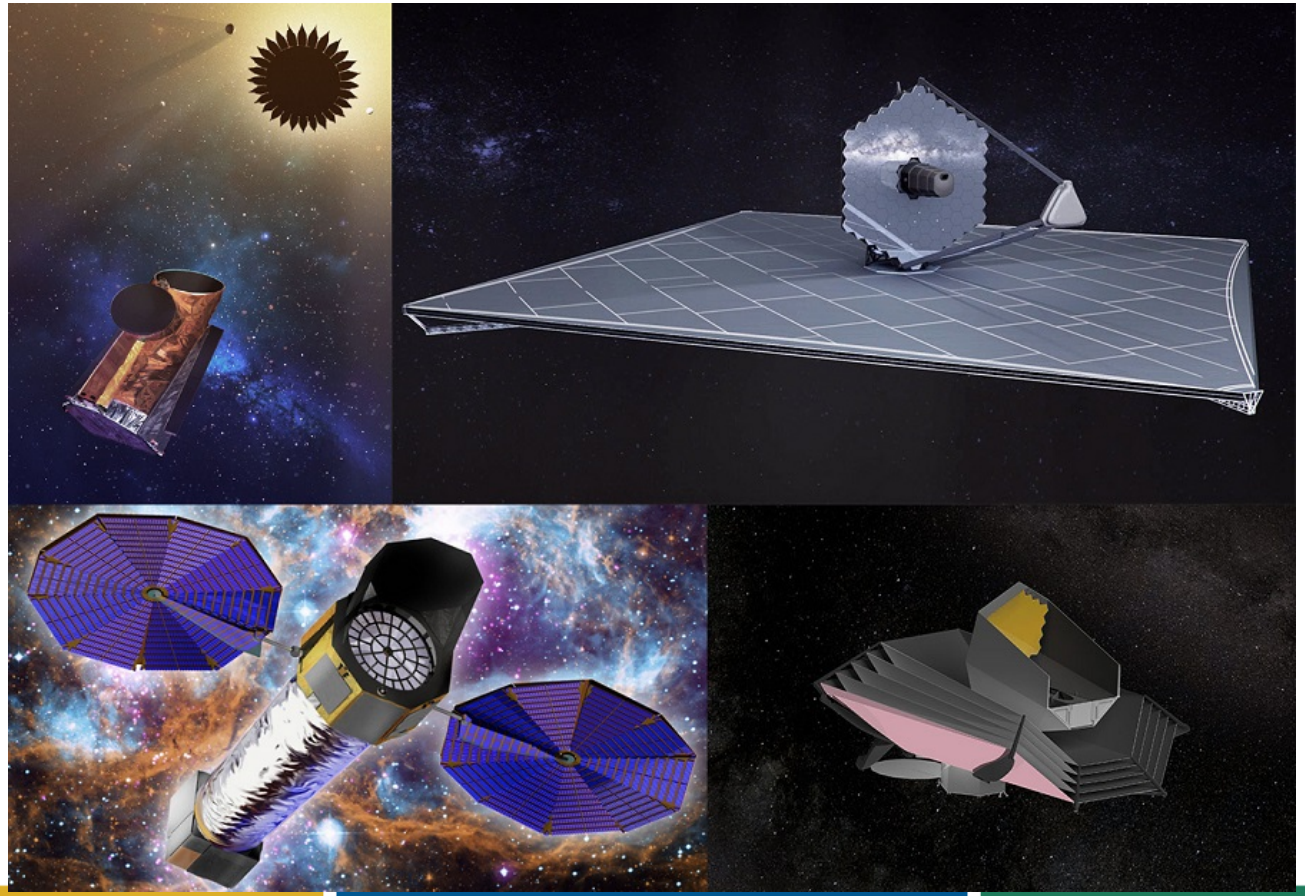
Science Panels, 6 Program Panels

- Science Panels
  - Provide scientific priorities that will be used to assess proposed missions, facilities, and projects, and develop an overall research strategy
- Program Panels
  - Assess proposed projects and activities against science priorities and technical readiness, risk, cost, and forward priority activities for ranking by the steering committee

Astro2020 Panels

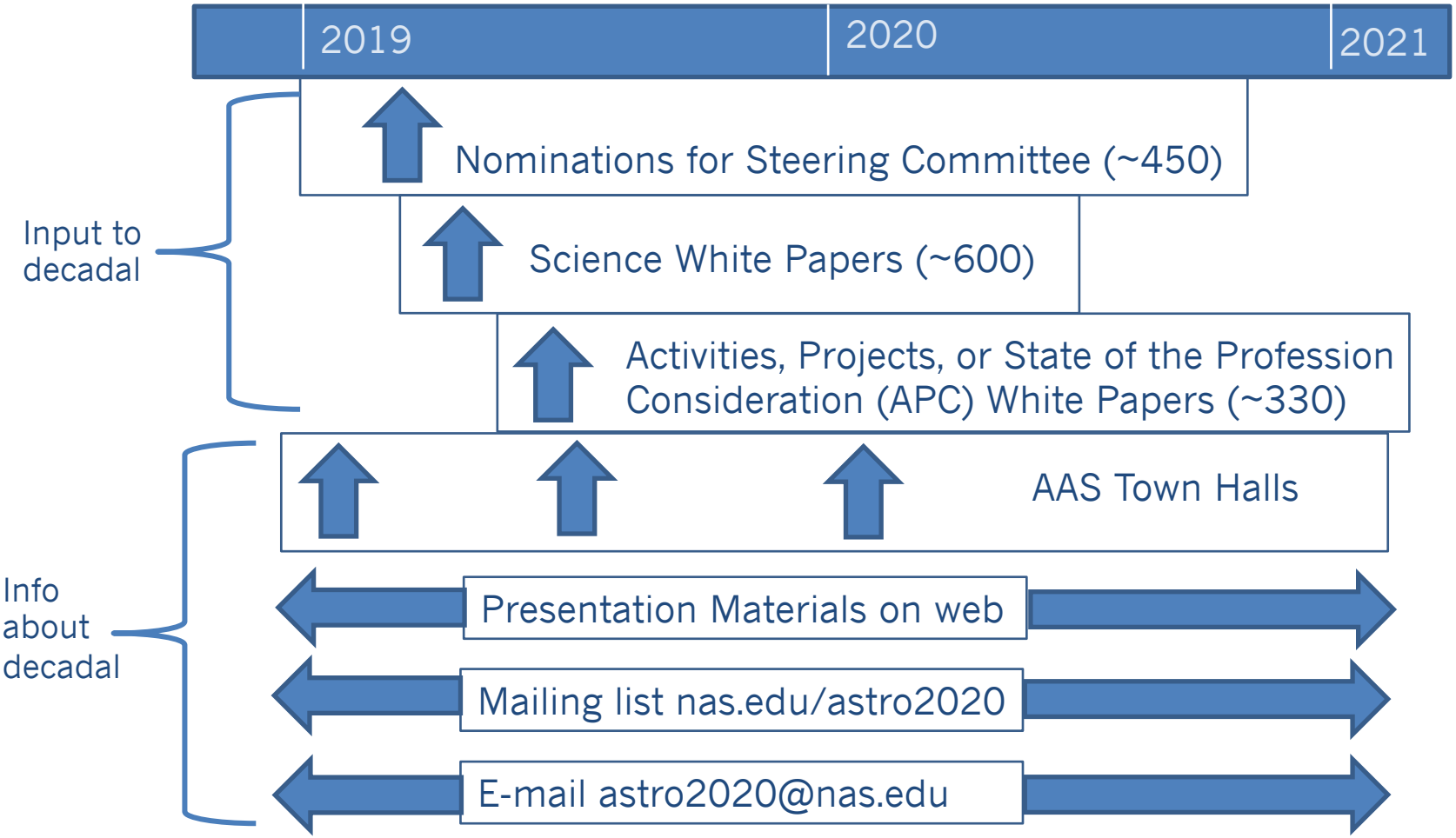
- Panel on Cosmology
- Panel on Galaxies
- Panel on the Interstellar Medium and Star and Planet Formation
- Panel on Stars, the Sun, and Stellar Populations
- Panel on Compact Objects and Energetic Phenomena
- Panel on Exoplanets, Astrobiology, and the Solar System
- Program Panel on Electromagnetic Observations from Space 1: optical and NIR
- Program Panel on Electromagnetic Observations from Space 2: radio, FIR, high-energy
- Program Panel on Optical and Infrared Observations from the Ground
- Program Panel on Radio, Millimeter, and Submillimeter Observations from the Ground
- Program Panel on Particle Astrophysics and Gravitation
- Program Panel on An Enabling Foundation for Research
- Panel on State of the Profession and Societal Impacts

Astro2020 Flagship Studies
HabeX, LUVOIR, Lynx, Origins
+ 10 Probe-class Studies

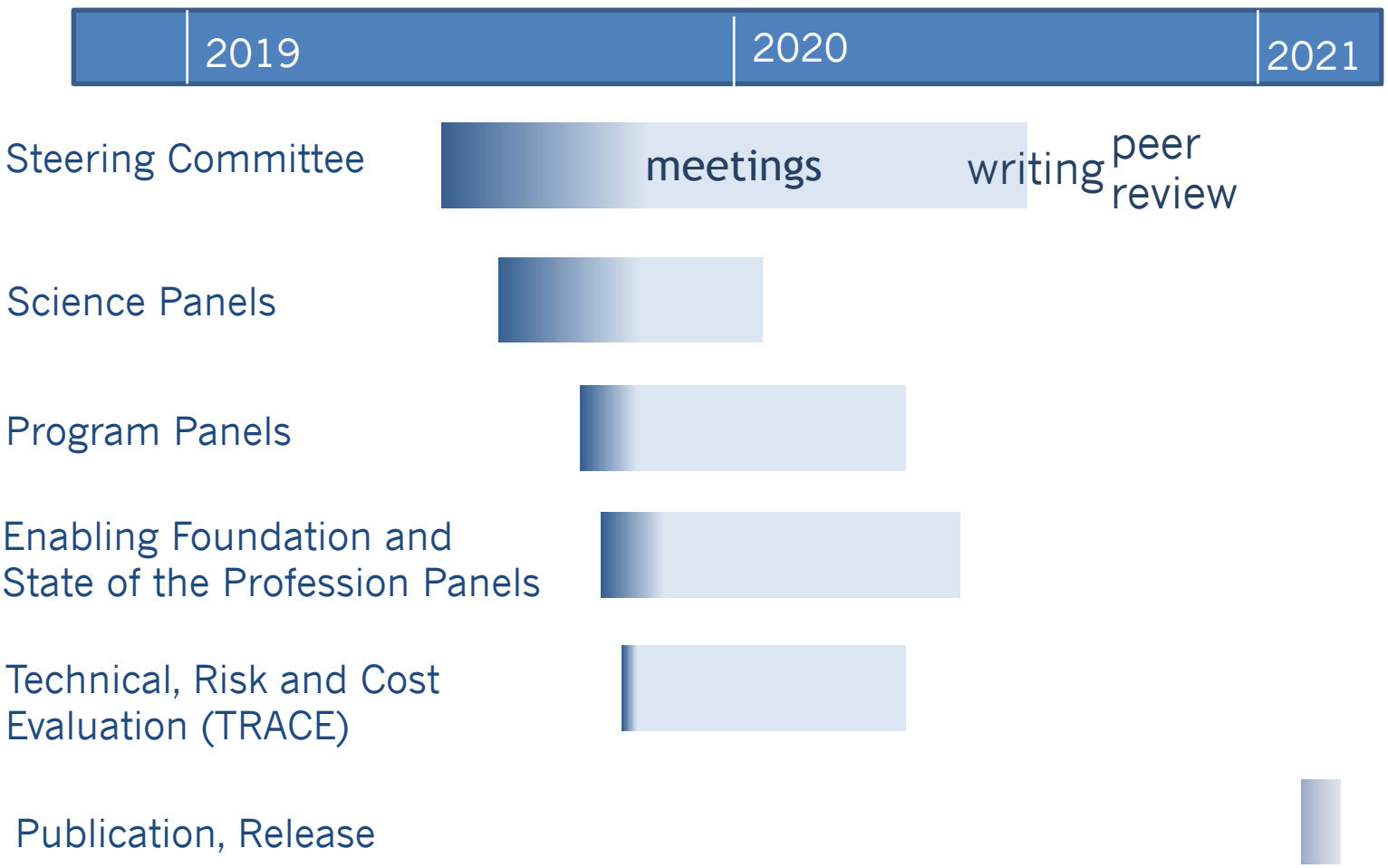


Astro 2020 **Public** Participation*

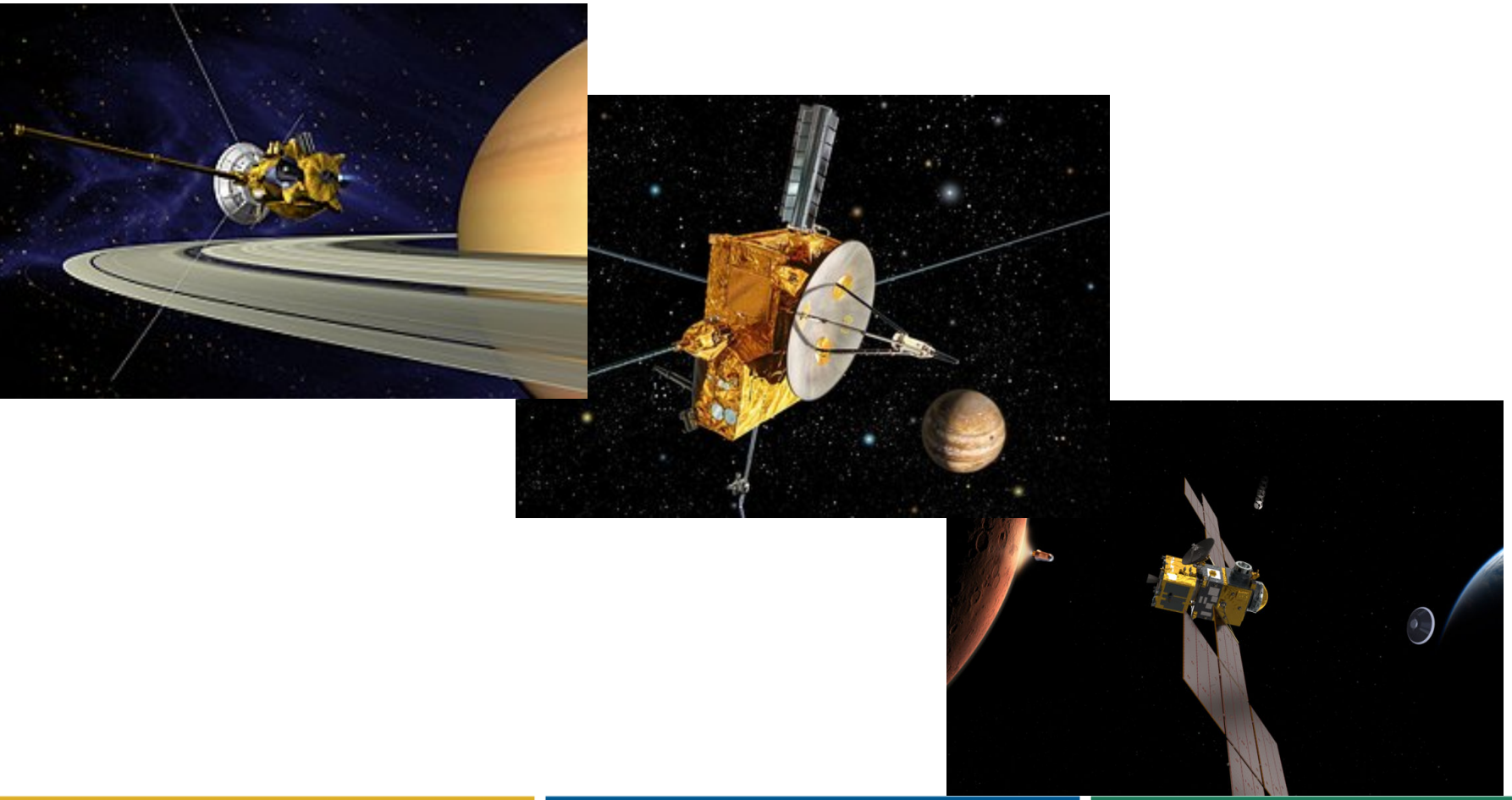
Astro2020* ***deliberations remain confidential until report release*

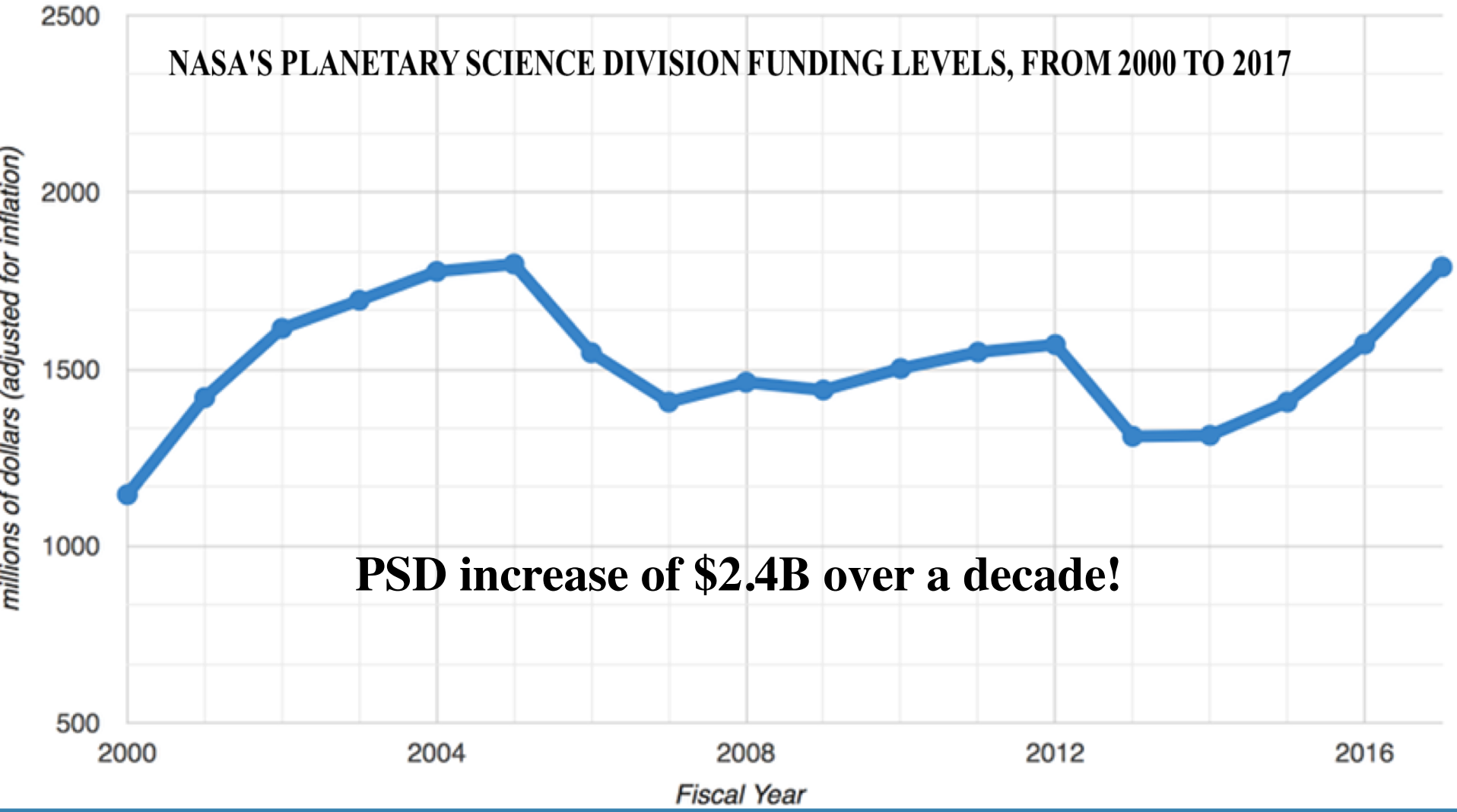


Astro2020 Notional Decadal Survey Timeline



Planetary Decadal NOTIONAL





Adjusted for inflation and programmatic consistency (e.g. removing DSN and DOE Plutonium management funding).
Source. (Planetary Society 2017)

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Notional Schedule: Planetary DS

~1/2020	**Statement of task finalized, proposal funded**
~2/2020	**White paper submission website opens**
~3/2020	**Chair selected and announced at LPSC**
~5/2020	**Deadline for submission of white papers**
~6/2020	**Survey committee and panel meetings begin**
~10/2021	**1st complete draft of survey report completed**
~3/2022	**Survey report released at LPSC**

Why go through all this work?
For these results,done with PARTNERS!