NASA Space Flight Programs and Projects
Terminology and Definitions

This document is intended to provide a framework for the Decadal Survey Committee, including providing a common basis for conversations with NASA and language for the final report. This document provides terms and definitions relevant to the Decadal Survey Committee's discussion on NASA space flight programs and projects. This content is drawn from existing NASA documentation, although may be a simplification of the source material to better suit the Committee's needs.

Agency Baseline Commitment (ABC): The documentation that establishes an integrated set of project requirements, cost, schedule, technical content, and the agreed-to confidence level(s) that forms the basis for NASA's commitment to the external entities of OMB and Congress. Only one official baseline exists for a NASA program or project, and it is the Agency Baseline Commitment.

Announcement of Opportunity (AO): A type of Broad Agency Announcement where NASA solicits investigations that require the implementation of a space flight mission for their completion. Selected investigations are either developed as PI-led projects or integrated into NASA-led projects.

Broad Agency Announcement (BAA): A technique by which an Agency acquires 1) basic and applied research, and 2) that part of development not related to the development of a specific system or hardware procurement. An Agency may use a BAA to fulfill its requirements for scientific study and experimentation directed toward advancing the state-of-the-art or increasing knowledge or understanding rather than focusing on a specific system or hardware solution. The BAA technique shall only be used when meaningful proposals with varying technical/scientific approaches can be reasonably anticipated.

- Note: A BAA cannot be used in cases where an Agency can characterize a requirement sufficiently to define in advance a common statement of work against which all proposals will be evaluated. That situation calls for a Request for Proposals.

Formulation: The first part of a project development process. It involves identifying how the project supports the program's goals and objectives, establishing program-level requirements and success criteria for a project, completing a preliminary mission design, and developing preliminary cost and schedule estimates.

- Note: NASA expects that every mission will produce data that enables the completion of science objectives beyond the scope of the project's investigation. However, those extra-investigation objectives do not flow requirements down to the project and are not part of the formulation process.

Investigation: An activity that analyzes scientific data for the completion of focused science objectives. NASA Announcements of Opportunity require the execution of an investigation that requires the implementation of a spaceflight mission within the same project.

Mission: Spaceflight technology that generates scientific data for use by an investigation. A mission may be self-contained (consisting of one or more project-controlled spacecraft and the science payload integrated onto it/them) or be hosted (a science payload integrated onto one or more spacecraft outside the control of a single project).

Program: A strategic investment that has a defined architecture and/or technical approach, requirements, funding level, and management structure that initiates and directs one or more projects. A program implements a strategic direction that the Agency has identified as needed to accomplish Agency goals and objectives. Each program is classified based upon the method of project formulation:

- Loosely Coupled Programs: These programs address specific objectives through multiple space flight projects of varied scope. While each individual project has an assigned set of mission objectives, architectural and technological synergies and strategies that benefit the program as a whole are explored during the Formulation process.
- Single-Project Programs. These programs tend to have long development and/or operational lifetimes, represent a large investment of Agency resources, and have contributions from multiple organizations/agencies. These programs frequently combine program and project management approaches, which they document through tailoring.
- Tightly Coupled Programs: Programs with multiple projects that execute portions of a mission(s). No single project is capable of implementing a complete mission. Typically, multiple NASA Centers contribute to the program. Individual projects may be managed at different Centers. The program may also include other agency or international partner contributions.
- Uncoupled Programs: Programs implemented under a broad theme and/or a common program implementation concept, such as providing frequent flight opportunities for cost-capped projects selected through Announcements of Opportunity (AO) or NASA Research Announcements. Each such project is independent of the other projects within the program.

Program Plan: The Program Plan is an agreement between the Mission Directorate Associate Administrator (who has final approval authority for the plan), the participating Center Director(s), and the program manager. It documents at a high level the program's objectives and requirements, scope, implementation approach, interfaces with other programs, environment within which the program operates, funding by time-phased cost plans consistent with the approved Program Commitment Agreement, and commitments of the program.

Project: A specific investment identified in a NASA Program Plan that has defined requirements, a life-cycle cost, a beginning, and an end. A project has a management structure and may have interfaces to other projects, agencies, and international partners. A project executes an investigation that yields new or revised results that directly address the managing program's goals and objectives.

- NASA Announcements of Opportunity require the execution of an investigation that requires the implementation of a space flight mission within the same project. Each project can be described based on who defines a project and who leads a project. This has

consequences for the necessary pre-formulation efforts and for the processes that NASA uses to formulate the project.

- PI-defined vs. NASA-defined
  - For a PI-defined project, NASA SMD identifies a broad theme (e.g. science discipline, technological capability for demonstration) and/or implementation mechanism(s) (e.g. cost cap, rideshare on a particular mission launch).
  - For a NASA-defined project, NASA SMD specifies the scope of the investigation (e.g. eligible science focus(es)) and/or project-level mission implementation (e.g. design reference mission).
- PI-led vs. NASA-led
  - For a PI-led project, NASA SMD selects a single Principal Investigator (PI) to be responsible for the overall project management. That responsibility includes 1) developing and operating the mission, and 2) executing the investigation.
  - For a NASA-led project, NASA SMD assigns overall project management responsibility to a NASA Center, Johns Hopkins University's Applied Physics Laboratory (JHU/APL), or Jet Propulsion Laboratory (JPL). NASA SMD then acquires a science payload and science investigations (see Pre-Formulation). A NASA-led project is often called a "directed" project.
- Examples of these combinations of definition and management paradigms are:
  - PI-defined, PI-led: 2018 Heliophysics Technology Demonstration. Explorers Program. Discovery Program.
  - NASA-defined, PI-led: Interstellar Mapping and Acceleration Probe (IMAP). New Frontiers Program. Martian Moons eXploration (MMX) contribution.
    - Note: MMX, and similar projects, are PI-led projects where NASA has entered into an agreement to support a science team and deliver an instrument for integration into a partner agency's mission. These have recently been solicited through a Focused Mission of Opportunity.
  - NASA-defined, NASA-led: Geospace Dynamics Constellation (GDC). Europa Clipper. Plankton, Aerosol, Cloud, ocean Ecosystem (PACE).

Pre-Formulation: The work before the official start of the project life cycle where NASA provides resources for concept studies prior to initiating a new project. These pre-Formulation activities involve Design Reference Mission analysis, feasibility studies, technology needs analyses, engineering systems assessments, and analyses of alternatives that typically are performed before a specific project concept emerges. Pre-Formulation activities include identifying risks that are likely to drive the project's cost and schedule and developing mitigation plans for those risks. Note that pre-Formulation costs are not included in life-cycle cost estimates.

- SMD NASA-led projects typically have three stages of pre-formulation work:

- Community-led pre-formulation: SMD supports science-community subject matter experts in the development and/or refinement of investigation objectives, the corresponding high-level requirements.
- NASA-led pre-formulation: Following the completion of any community-led pre-formulation, NASA stands up a pre-project office at a NASA Center, APL, or JPL under the management of a program office. That pre-project office executes any remaining pre-formula activities, takes the project through Mission Concept Review (the first project lifecycle review) and Key Decision Point A (KDP A). A pre-project office typically transitions into the project office following a successful KDP A.
- Mission solicitation: Following a successful KDP A, NASA acquires the science payload and science investigation(s). The payload may be acquired through a combination of a Request for Proposals, a Focused Mission of Opportunity solicitation, or directed work (to a NASA Center, JHU/APL, or JPL). The investigation may be acquired through a combination the Focused Mission of Opportunity solicitation, one or more stand-alone investigation solicitations, and/or directed work (to a NASA Center, JHU/APL, or JPL).