Program Plan
Discovery Program

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1.0 PART I: PROGRAM OVERVIEW

1.1 INTRODUCTION

The Discovery Program was initiated in 1992 as a way to ensure frequent access to space for planetary system(s) science investigations. The Discovery Program is a science program of frequent, small spacecraft missions that will perform high-quality focused scientific investigations. It consists of a long-term series of space science missions that are independent, but share a common program funding, management structure, and set of goals. The program emphasizes missions that can be accomplished under the leadership of the scientific research community. The Discovery Program provides the following two classes of projects:

Discovery Missions – complete, science investigations launched on an expendable launch vehicle as a primary payload. Each mission includes definition, development, launch service, mission operations, archiving, data analysis, education and public outreach, and is performed within the NASA Science Mission Directorate (SMD) cost-agreed-to at the Confirmation Review; and

Missions of Opportunity (MO) – investigations flown as part of a non-Space Science mission of any size, and having a NASA cost under $35 million (in Fiscal Year 2005 dollars) total cost to NASA. These missions are conducted on a no-exchange-of-funds basis with the organization sponsoring the mission. NASA intends to solicit proposals for MO with each Discovery Mission Announcement of Opportunity (AO).

Program level requirements for each project are approved by the SMD at the time of project confirmation, prior to the start of project implementation. The Principal Investigator (PI) for each Discovery project is responsible for the overall success of the project, and is accountable to the Associate Administrator of SMD (AA for SMD) for the scientific success and to the Discovery Program Manager for the programmatic success.

The Discovery Program is currently in the implementation phase. The Program has an approved Program Commitment Agreement (PCA). The Discovery Program missions approved for implementation are summarized in Appendix D.

1.2 PROGRAM GOALS, OBJECTIVES, AND METRICS

The Discovery Program is designed to accomplish frequent, high-quality planetary science investigations, using efficient management approaches. The Program's prime objective is to enhance our understanding of the solar system as it is today and of solar system formation and evolution. In order to maintain launch frequency, the program must seek to contain total mission cost and development time, and improve performance through the use of validated new technology and through commitment to, and control of, design, development and operations costs. The Program also supports SMD goals to enhance public awareness of, and appreciation for, space exploration and to incorporate educational and public outreach activities as integral parts of space science investigations.

The goals and strategies outlined in the Science Mission Directorate's Strategic Plan encompass a wide range of scientific questions spanning many scientific disciplines. The Discovery Program solicits only those investigations which lead to flight projects that investigate planetary science. The term "planetary science" encompasses the scientific objectives in the Strategic Plan that address the goals of the Solar System Division and the search for extrasolar planetary systems element of the Universe Division.

The Discovery Program's Objectives and Goals as shown in Figure 1 below.

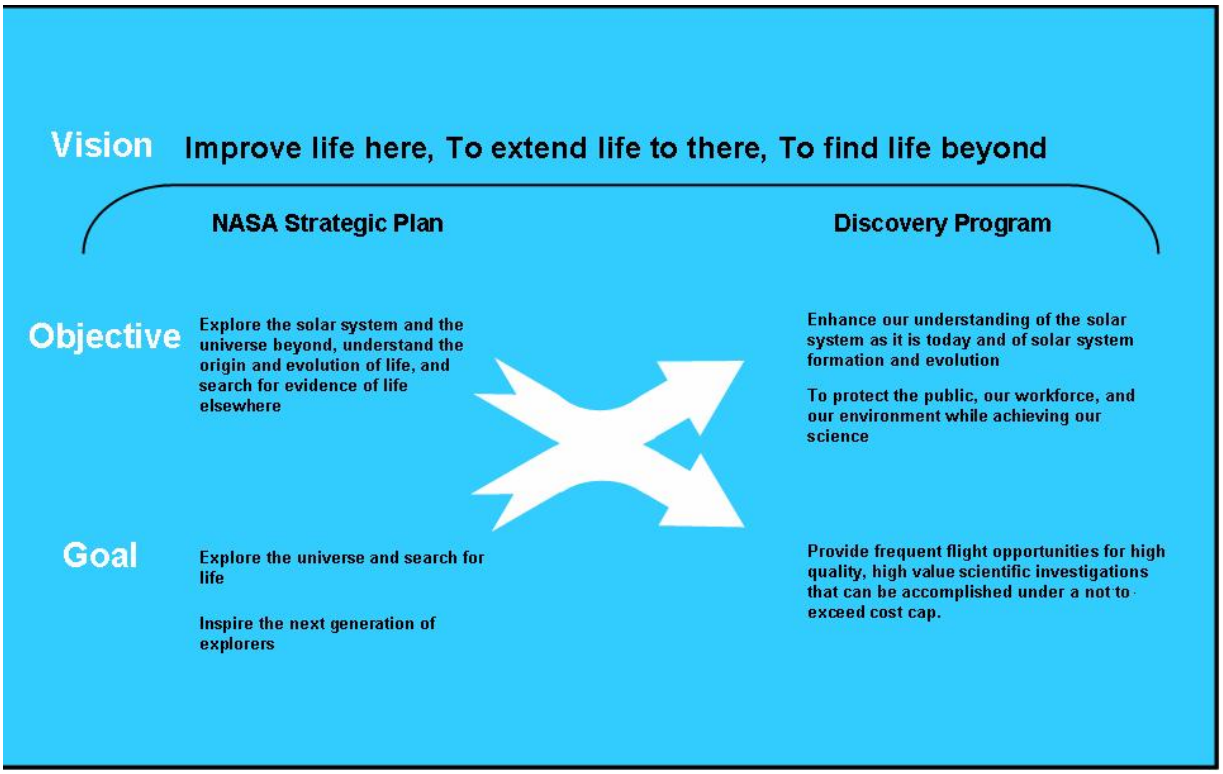

FIGURE 1: DISCOVERY PROGRAM OBJECTIVES AND GOALS

The Discovery Program's Objectives and Goals will produce the following outcomes:

Advancement in scientific knowledge and exploration of the elements of our solar system and other planetary systems;

Addition of scientific data, maps, and other products to the Planetary Data System archive for all scientists to access;

Announcement of scientific progress and results in the peer-reviewed literature, popular media, scholastic curricula, and materials that can be used to inspire and motivate students to pursue careers in science, technology, engineering, and mathematics;

Expansion of the pool of well-qualified Principal Investigators and Project Managers for implementation of future missions in Discovery and other programs, through current involvement as Co-Investigators and other team members; and

Implementation of technology advancements proven in related programs.

Section 2.1 identifies the performance measures for confirming the success of the Discovery Program.

1.3 CUSTOMER STAKEHOLDER DEFINITION AND ADVOCACY

The Discovery Program customer base is centered in the space science community (especially within the planetary science community) representing the space science themes included in the Solar System Division, excluding Mars, and the extra-solar planetary systems search element of the Universe Division.

Discovery Program customer advocacy is achieved through interactions between the Science Mission Directorate and the science community. These interactions involve the NASA SMD scientific advisory committees, scientific conferences and meetings, and day-to-day contacts by Discovery program scientists and discipline scientists resident in the SMD. Each Discovery mission will have a principal investigator (and may also have a project scientist at the implementing organization) who will provide the primary science community interface for that specific project.

Contact between the Discovery Program Manager at the Marshall Space Flight Center (MSFC) and the science community is typically through the selected PIs, the Discovery Lead Program Scientist and Program Scientists for the missions, advisory committees, AO pre-proposal conferences, scientific meetings, and periodic workshops to solicit feedback on Program processes and Program effectiveness.

1.4 PROGRAM AUTHORITY AND MANAGEMENT STRUCTURE

This section describes the authority and management structure of the Discovery Program. It addresses the roles and responsibilities of key program participants involved in all phases of the Program and Project life cycles.

1.4.1 AUTHORITY

The Discovery Program management structure consists of three principal levels of authority:

1. Scientific and strategic management within SMD (includes science/mission selection);

2. Discovery Program management at MSFC (program implementation);

3. Management of individual Discovery missions by their respective PI-led project teams.

The AA for SMD has established the Discovery Program Director at Headquarters as the senior Agency official, who serves as the SMD focal point for Discovery scientific and strategic management.

Program Management authority has been delegated by the Associate Administrator of the Science Mission Directorate through the Discovery Program Director to the Discovery Program Manager (within the Space Systems Programs and Projects Office at MSFC). The Discovery Program Manager at MSFC serves as the single point of contact for Headquarters at MSFC. The MSFC Center Director is responsible for ensuring that Center resources required to execute the MSFC effort on the Program are provided.

Management authority for each Discovery Mission has been assigned to the respective Principal Investigators. Each PI has responsibility for the overall success and safety of his/her mission and is accountable to the AA for SMD for the scientific success and to the MSFC Program Manager for the programmatic success.

To ensure an unambiguous line of direction and reporting within these levels, all formal direction from Headquarters to MSFC flows from the Program Director to the Program Manager. Similarly, to ensure an unambiguous line of direction and reporting with individual missions, all formal direction from the Program to the Mission flows from the Program Manager to the PI and Project Manager.

Figure 2 illustrates the Discovery Program management structure, including the relationships between the key program participants; Figure 3 illustrates the Discovery Program Office organization at MSFC.

The following sections further define the roles and responsibilities of the key participants in the Program.

1.4.2 ROLES AND RESPONSIBILITIES: SCIENCE MISSION DIRECTORATE

The Science Mission Directorate within NASA Headquarters has the responsibility for the scientific and strategic direction of the Discovery Program within the Solar System Exploration theme. These responsibilities include the following:

1.4.2.1 ASSOCIATE ADMINISTRATOR (AA)

The Associate Administrator (AA) for Science has final authority and responsibility for the Discovery Program, as designated in NASA Procedural Requirement (NPR) 7120.5 C, NASA Program and Project Management Processes and Requirements.

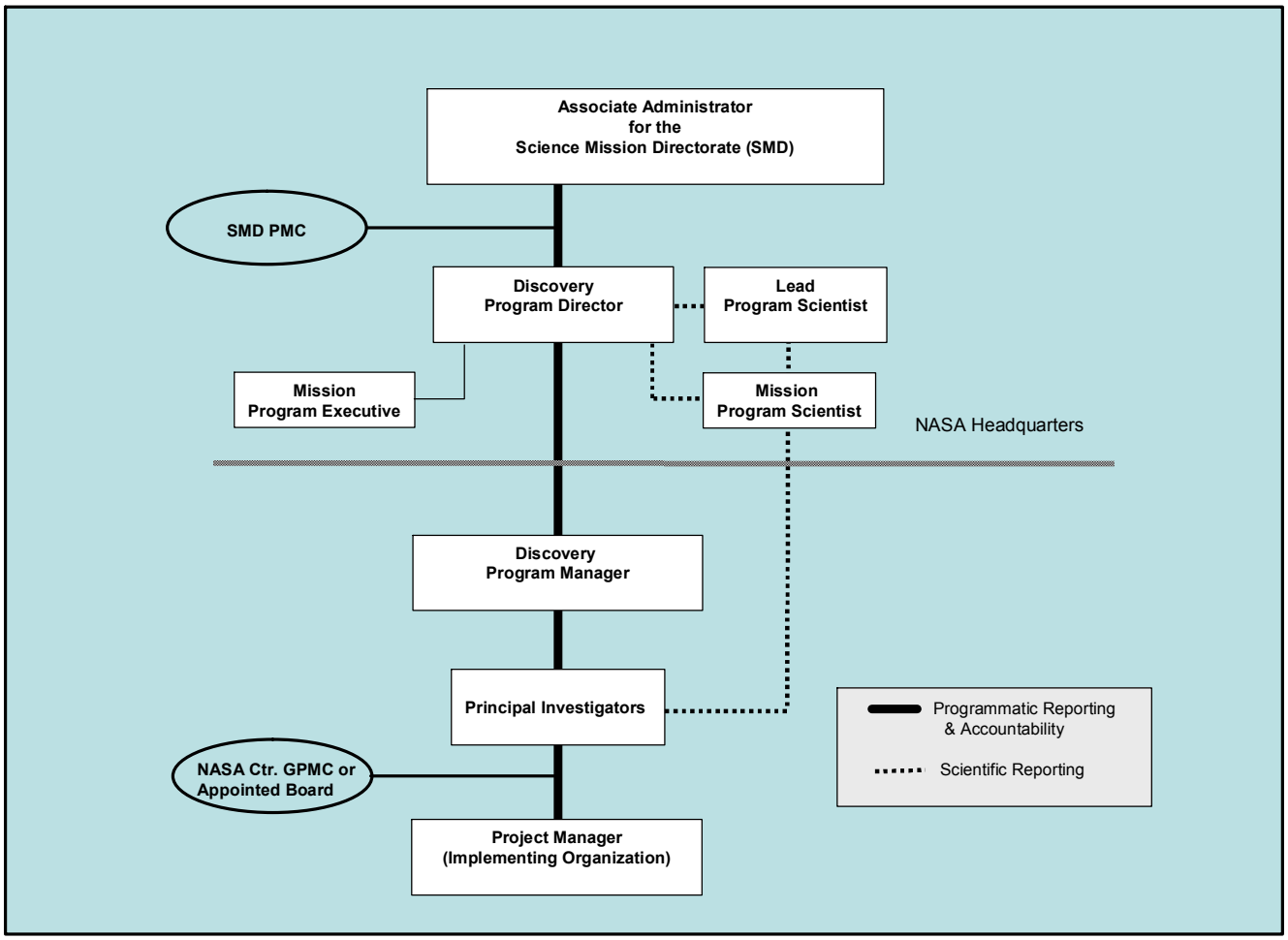

FIGURE 2: DISCOVERY PROGRAM ORGANIZATION

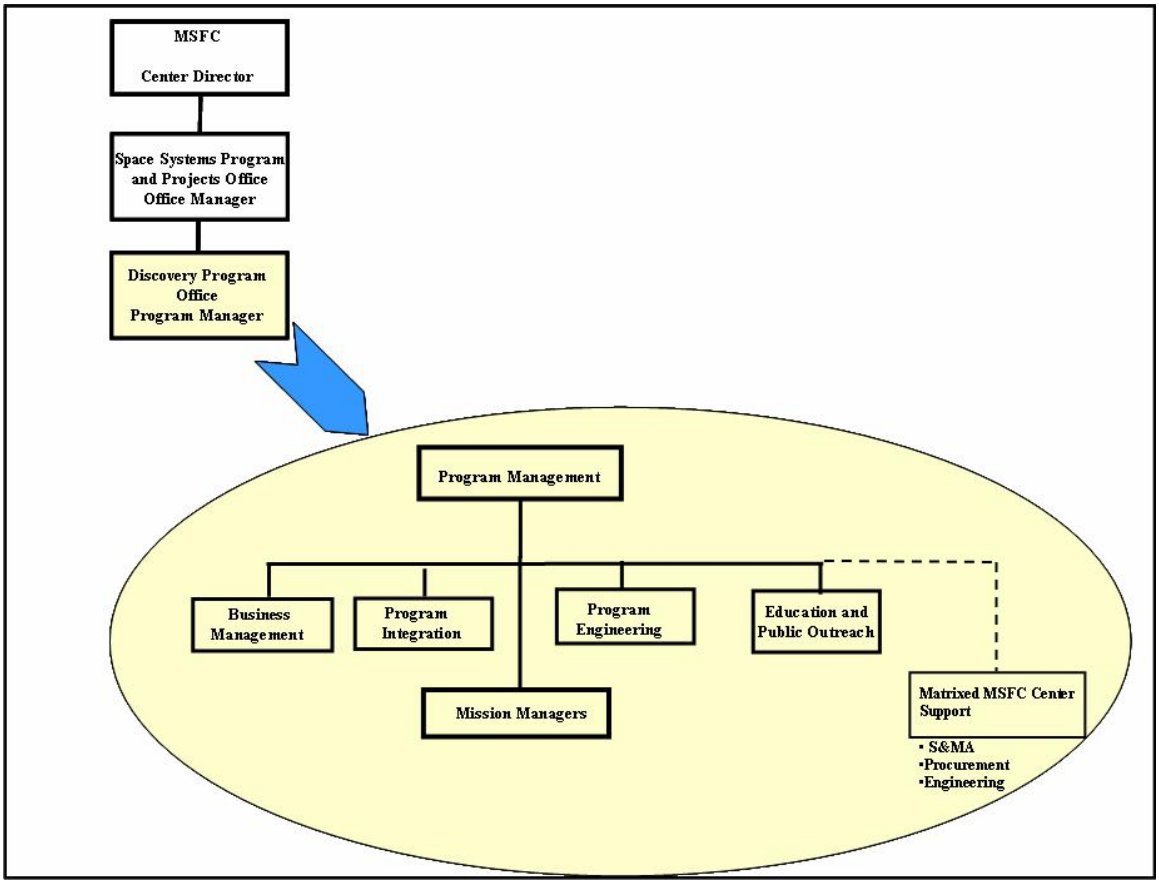

FIGURE 3: DISCOVERY PROGRAM OFFICE AT MSFC

1.4.2.2 DISCOVERY PROGRAM DIRECTOR

The Discovery Program Director at NASA Headquarters is the senior official in charge of the Discovery Program. The Discovery Program Director has overall responsibility for all phases of the Discovery Program and serves as the single focus for the Program within SMD. The Program Director will:

Establish Program-level strategic goals and policies;

Develop and maintain the Discovery Program Commitment Agreement (PCA);

Develop and manage Program level metrics to assess the performance and health of the Program;

Develop and negotiate agreements for cooperation between Discovery missions and other NASA Directorates, other agencies. Coordinate launch vehicle and communication budgets with the Space Operations Mission Directorate;

Manage the launch approval and environmental impact processes as necessary to support selected missions;

Assign Mission Program Executives and Program Scientists in coordination with the relevant SMD Division Directors;

Advocate the Discovery Program with key customers and stakeholders to ensure the necessary support for its success;

Ensure effective Program communications across SMD and NASA;

Authorize Project Termination Reviews;

Authorize the total Discovery Program budget; and

Submit Discovery technology needs into the SMD Technology Programs.

1.4.2.3 MISSION PROGRAM EXECUTIVES

The Program Executive supports the AA for SMD and the Program Director in defining, integrating, and assessing Discovery Flight Program and Project activities. Discovery Program responsibilities include:

Maintaining cognizance of the project's programmatic health via regular contact with the project during implementation (Phase B, C, D, E), principally by exposure to reports from the project, monthly status and major milestone reviews, access to assessments coordinated by the Program Office, and ad hoc interactions deemed necessary to assess project performance.

Resolving project issues through the Discovery Program Office;

Provide NASA policy and guidance to the program and projects;

Negotiate content of international agreements with external organizations;

Negotiate content of agreements with other U.S. agencies and organizations;

Support selection of missions, and assignment of selected projects to implementing organizations centers;

Establish the Program Commitment Agreement within the Agency;

In collaboration with the mission Program Scientist, Program Office Mission Manager, and PI, finalize development of the mission Program Level Requirements Appendix (PLRA) and prepare it for formal negotiation and final agreement;

Assess implementing organization's performance to budget, schedule, and against level 1 requirements;

Communicate program and project performance to SMD Management;

Develop mission success criteria and ensure launch documentation; and

Coordinate issues with other SMD divisions and with HQ Functional offices.

1.4.2.4 GOVERNING PROGRAM MANAGEMENT COUNCILS (GPMC)

The Science Mission Directorate Program Management Council (PMC) is the governing PMC for the Discovery Program. Each Discovery project shall be monitored by the SMD PMC, or if delegated, its applicable Center Governing Program Management Council (GPMC) or by a Program appointed board.

1.4.2.5 PROGRAM LEAD SCIENTIST

The Discovery Program Lead Scientist at NASA Headquarters reports directly to the Program Director. He/she resides administratively in the Solar System Division of SMD. The Program Lead Scientist will:

Manage the science selection process, including definition, timing, preparation, and issuance of Announcement of Opportunities (AOs); Pre-proposal Conferences; scientific and technical reviews of submitted proposals; and preparation for selection of Discovery investigations;

Manage the downselect process, including Concept Study Kickoff, scientific and technical reviews, and preparation for downselect of Discovery investigations;

Develop the scientific strategy, goals, and objectives for the Program;

Serve as the primary science spokesperson for the Program and the primary interface with customers, stakeholders, and external elements for scientific objectives and accomplishments;

Provide leadership for the conduct of AOs, NASA Research Announcements (NRA), and the peer review process leading to selection; and

Charter program science working groups, if any.

1.4.2.6 MISSION PROGRAM SCIENTISTS

Discovery mission program scientists are responsible to the Program Director within SMD for the scientific integrity of specific assigned missions and for maximizing mission science return within Program constraints. Each mission program scientist will:

Collaborate with the Lead Program Scientist, Program Executive, Discovery Program Office, and the PI in the generation of the mission PLRA, particularly the Level 1 Requirements;

Maintain regular contact with the Mission Principal Investigators;

Monitor the impact of proposed mission changes on the Level 1 Requirements;

Generate the solicitation for any mission participating scientists beyond the PI Team, and manage the proposal review process leading to selection;

Monitor and provide regular reports to NASA on science-related issues, including recommendations for future courses of action; and

Provide regular updates to NASA and the broad community on mission science results.

1.4.3 ROLES AND RESPONSIBILITIES: DISCOVERY PROGRAM OFFICE AT MSFC

The Discovery Program Manager has programmatic management responsibility for Discovery mission project formulation, development, launch, on-orbit checkout, mission operations, and data analysis. The Discovery Program Manager has responsibility for planning and implementation of the Discovery Program consistent with top-level policies, strategies, requirements, and funding established by NASA Headquarters.

The Program Manager is responsible for ensuring that the Discovery project adheres to committed cost, schedule, performance, reliability, safety requirements, and Education and Public Outreach (E&PO). The Discovery Program Manager has the following specific responsibilities:

Implement the Discovery Program for the SMD selected missions for Phase B, C, D, and E;

Maintain cognizance of status of international agreements that have Program- or project-level implications;

Coordinate the provision of Government-furnished services and hardware, including space communication support and launch vehicle services, for all selected Discovery missions;

Ensure open communication with Discovery Program customers and communicate Program customer needs to SMD;

Establish project performance metrics and provide regular assessment reports to the Program Director;

Establish mission reporting requirements;

Convene special peer reviews when specific technical concerns confronting a project warrant external review;

Manage the Discovery Program mission implementation budget. Develop detailed Program Operating Plans (POP) and Cost Phasing Plans for the implementation budget. Ensure appropriate distribution of funds to implementing organizations by directing 506 funds transfer;

Assess the Program for Project Liens and Threats which could impact the Discovery Futures Budget;

Assigning a Program Office Mission Manager to each mission;

Develop and maintain independent cost-to-complete estimates for key projects during Phase B, C, and D as appropriate;

Establish and perform technical and resource management oversight of mission contracts and task orders;

Lead project technical assessments and audits (as required). Provide program technical experts as required to support the projects;

Establish Independent Assessment Teams (IAT), as chartered by SMD, to assess Discovery projects (after Phase A selection), in cooperation with the SMD program executives;

Assess mission implementation schedules and control major mission milestones;

Ensure program safety and mission success. Review and ensure adequacy of project safety and mission assurance plans;

Independently evaluate and assess missions to identify risks and mitigations, within program resource constraints. Assess mission identified risks and mitigation plans. Authorize independent assessments of projects;

Participate in project milestone reviews as defined in Table 2 and conduct project reviews as defined in Table 3;

Provide independent certification of project flight readiness to the AA for SMD;

Recommend project termination reviews as warranted by project performance;

Ensure that Agency and Program lessons learned are incorporated appropriately into each mission;

Disposition Mission flight and ground hardware;

Support SMD in the initiation and preparation of Discovery AOs; and

Plan, coordinate, and implement an education and outreach program for the Discovery Program.

1.4.3.1 DISCOVERY MISSION MANAGERS

Discovery Program Office Mission Managers function as the Program Manager's day-to-day point of contact for all assigned Projects, performing technical and programmatic management functions on behalf of the Program Manager and ensuring the Program Manager maintains an awareness of the project status. The Mission Manager's responsibilities include:

Interface directly with the PIs and Project Managers to develop inputs for Program planning and integration or to resolve project issues;

Perform independent evaluation of project metrics, schedule, cost data, management, and issues for the Program Manager;

Perform independent assessments of projects to identify risks and mitigations:

Identify Project liens and threats which could result in mission cost cap breaches;

Coordinate project funding requirements;

Provide a monthly project assessment to the Program Executive;

Serve as the Program Office representative between NASA, other U.S. Government agencies, and foreign participants on behalf of assigned missions;

Ensuring that appropriate Program resources are provided to the Projects in a timely manner;

Serving as the Program Office advocate to NASA management, the Public, and other Government entities for assigned Projects; and

Lead the development of decision packages or products that are fully coordinated within the Discovery Program and with the related Principal Investigators and Project Managers.

1.4.4 ROLES AND RESPONSIBILITIES: PRINCIPAL INVESTIGATOR (PI)

Overall responsibility for scientific integrity and mission success is vested with the Principal Investigator of each Discovery mission. This individual is the lead scientist, and will organize the team or consortium that will develop the mission concept, propose it, and, if selected, implement the mission under the prescribed guidelines and constraints. The consortium may include members from one or more of the following: industry, Federally Funded Research and Development Centers (FFRDC), universities, nonprofit institutions and/or governmental organizations, such as NASA Centers. The PI chooses the

management approach best suited to the mission design, skills/expertise of the team members, and resources.

NASA holds the PI accountable for proper execution of all aspects of the mission, particularly as outlined in the mission's original AO, accepted Concept Study Report, and mission PLRA. It is incumbent upon the PI in any management arrangement to notify the Discovery Program Manager if the successful achievement of the minimum scientific objectives is not possible within the prescribed programmatic constraints.

Mission Project Managers are appointed by the implementing organizations with PI concurrence. Each Discovery Project Manager is responsible to the PI for the successful development and implementation of the mission. They report to their institutional management and programmatically through the Discovery Program Manager.

The Discovery Program Office will establish an interface directly to the mission Project Manager at the implementing organization. This organization may be either a Government organization or another type of institution depending on the particular mission. The Discovery Program Office will work directly with the Project Manager in accomplishing the mission, particularly in the areas of resource allocation and utilization, oversight, reporting, and resolution of project issues.

Each PI, working with the mission Project Manager, has the following specific responsibilities:

Maintain oversight of the scientific aspects of all phases of the project;

Serve as a scientific spokesperson for the mission and for the scientific investigations;

Assure dissemination of scientific results through professional publications and education and public outreach;

Inform the Discovery mission Program Scientist of status, changes, or results in the mission science;

Represent the Project to NASA, other Government agencies, industry, and institutions as required on matters pertaining to the mission. Support NASA in performing Discovery Program advocacy;

Request NASA concurrence on key personnel changes occurring after Phase A downselect;

Plan, develop, and execute a mission to achieve its scientific requirements, within prescribed guidelines and constraints as defined in the PLRA and Project Plan;

Develop project-level implementation plans, schedules, and budgets in accordance with Program requirements, project objectives and constraints, and with other applicable NASA policies;

Communicate urgent/significant design, test, or operational anomalies to the Program Manager;

Support independent assessments and confirmation reviews;

Manage the mission budget. Identify and report liens and threats. Develop Program Operating Plan submittals and traces;

Establish and manage contracts for mission implementation. Perform technical and resource management of task orders for mission implementation, which use common NASA contract mechanisms;

Implement a safety and mission assurance program on the mission;

Develop and implement a risk management process throughout the mission lifecycle. Assess and report Project Risks to the Discovery Program;

Develop and maintain the mission Project Plan in accordance with NPR 7120.5C;

Establish a mission review process. Conduct/Participate in mission reviews as defined in the Project Plan;

Certify by letter to the AA for SMD, the flight readiness of the mission. For NASA field Centers and JPL, this will be accomplished by the respective Center's Program Management Council. For non-NASA Institutions, this will be accomplished by a Program appointed board;

Provide timely Project lessons learned to the Program for distribution;

Develop and implement an education and public outreach activity for the mission, in coordination with the Discovery Program E&PO; and

Develop and mature appropriate technologies, as agreed to in the PLRA and Project Plan, for a specific mission.

1.4.5 ROLES AND RESPONSIBILITIES: LARC SCIENCE SUPPORT OFFICE

The Langley Research Center (LaRC) Science Support Office (SSO) will perform the following functions:

Assist SMD with the preparation and issuance of AOs;

Support the review of proposals by conducting reviews of technical, management, cost and other programmatic factors;

Conduct independent assessments of ongoing missions, when requested; and

Conduct confirmation assessment reviews, when requested.

1.4.6 PROGRAM DOCUMENTATION RESPONSIBILITIES

The responsibilities for developing, concurring, and approving the principal program documents are shown in Table 1.

TABLE 1: DISCOVERY PROGRAM DOCUMENTATION CONTROL

Document	Preparer	Approving	Concurring	Configuration Management
Program Plan	Program Manager	Program Manager MSFC Center Director Program Director AA for SMD		Discovery Program Office (MSFC)
Program Plan-Appendix C (Discovery Program Budget and Summary Schedule)	Program Manager	Program Director		Discovery Program Office (MSFC)
PLRA (Note: This document is an Appendix to the Discovery Program Plan)	Program Executive (Initial issue) Program Manager (Revisions)	Principal Investigator Implementing Organization Director (as appropriate) Program Manager Program Director AA for SMD	Project Manager Program Executive Program Scientist SMD Directors (as required)	Discovery Program Office (MSFC)
Mission Project Plan	Project Manager	Principal Investigator Project Manager Program Manager	Implementing Organization Director (as appropriate)	Mission Project Office
Mission Project Plan Cost/Schedule Appendix	Project Manager	Principal Investigator Project Manager Program Manager		Mission Project Office
Mission Contingency Plans	Program Executive	Program Director AA for SMD	Program Manager	SMD

2.0 PART II: PROGRAM BASELINE

2.1 PROGRAM REQUIREMENTS

The program level requirements for Discovery are:

- The Discovery Program will launch an average of one mission per 24 months, with a goal of one per 18 months, commensurate with the availability of adequate funding. This performance count will not include those Missions of Opportunity selected under a Discovery Announcement of Opportunity (AO). (The launch of Missions of Opportunity (MO) is as appropriate, based on date selected, funding profiles, and expected launch dates for the host missions).

- The schedule for all Discovery missions will be such that launch typically occurs within 35 months from the start of Phase C/D (the project implementation phase). No constraint is placed on the length of project formulation or mission operations and data analysis phases.

Discovery Projects shall use a cost-effective, domestic, flight-proven Expendable Launch Vehicle (ELV). Each Discovery AO describes the launch vehicle details or appropriate options for access to space. SMD provides access to space and launch vehicle funding as part of the total cost cap for each mission. Foreign launch vehicles may be utilized only if contributed by the foreign organization (on a no-exchange-of-funds basis) and the launch vehicle meets NASA quality and reliability standards. Purchase of foreign launch vehicles would require obtainment of a Presidential waiver and is not a recommended option under the Discovery Program.

Discovery Projects are independent, sharing common science themes and a common program funding/management structure (reference sections 1.1 and 1.2). Therefore, there are no Program Level requirements that are sub allocated out to the individual projects. Instead, the Program level requirements stated above are flowed into the acquisition process (Announcement of Opportunity), used to select missions (reference section 3.3). Once selected, the mission-specific requirements for each Discovery project are set forth in a Program Level Requirements Appendix (PLRA) to this document, approved by the Principal Investigator, the Program Manager, and SMD (Reference Table 1 for a complete signature list). The PLRA includes the Level I requirements for each mission.

Each mission-specific PLRA shall define both the baseline and the minimum science requirements based on the selected proposal and according to the following definitions:

Baseline Science Requirements – That mission that, if fully implemented, will accomplish the entire set of scientific objectives identified at the initiation of the mission.

Minimum Science Requirements (Science Floor) – The minimum scientific requirements below which the mission will not be considered justifiable for the proposed cost.

The PI shall have the flexibility to descope the project science requirements from the baseline to the minimum science requirements in incremental fashion as delineated in the approved proposal and Concept Study Report. Such descopes require the concurrence of the Discovery Program Manager, Program Scientist, and Program Director before these options are exercised.

All Discovery projects are cost-capped. The cost cap shall apply to the full life-cycle cost (LCC) for formulation, implementation, launch, operations, data analysis, archiving, and closeout. The cost cap includes all project held reserves. The maximum allowable cost cap for each Discovery mission class is defined in the applicable AO; however, a mission-specific cost cap shall be established for each project through the proposal and formulation process.

Discovery Projects have been designated as Category II per NPR 7120.5C, due to their mission success visibility. The Science Mission Directorate PMC may elect to delegate the GPMC responsibility to the implementing organization. GPMC delegation will performed on a case-by-case basis and documented in the mission PLRA. Project review teams will be led by SMD chartered Independent Assessment Teams. (IAT).

Project Category	Priority	Life Cycle Cost	Governing PMC	Review Team Lead
Category II	Moderate	$100M<LCC<$500	Mission Directorate	As directed by SMD

CRITICAL EVENT COVERAGE

The Discovery Program AOs require that missions plan for and provide critical event data that can be recovered for adequate anomaly reconstruction should such an event occur. Critical events are defined as key events that could result in loss of a mission (e.g., during orbit insertion; entry, descent, and landing; etc.). Critical event coverage may be provided in the fashion most appropriate for the proposed investigation, including the use of available space assets and or Deep Space Network (DSN) tracking resources. Proposals must discuss the technical approach and implementation concept by which this requirement will be achieved in sufficient detail to allow evaluation.

PLANETARY PROTECTION

Discovery investigations shall follow established protocols that address forward and back contamination with respect to other solar system bodies per NASA Procedural Directive (NPD) 8020.7. The return of samples from certain target bodies may be subjected to rigorous containment and biohazard testing protocols in accordance with NASA Procedural Requirement (NPR) 8020.12.

RETURNED SAMPLE HANDLING

Any samples of extraterrestrial materials returned by Discovery missions shall be delivered to the NASA Astromaterials Curatorial Facility located at NASA's Johnson Space Center (JSC). Investigation teams are responsible for all aspects of the delivery of such materials to this facility, and this facility will be responsible for providing for the physical security, inventory accountability, environmental preservation, and distribution of the samples in support of scientific research programs organized around each mission, including sample processing in support of the mission science team. Investigation teams will be responsible for the funding of the Astromaterials Curatorial Facility to support their mission. NASA shall be responsible to maintain (including funding) the remainder of the sample(s) not provided to the science team or international partners in pristine condition for research competitively proposed by the community at large.

PROGRAMMATIC SUCCESS CRITERIA

The Discovery Program key performance parameters are:

An average mission launch rate of one mission per 18 months (goal) to 24 months (threshold), commensurate with the availability of adequate funding;

For each mission, the primary planned launch date shall be within the time period specified by the associated AO, typically 35 months of the start of project implementation; and

Accomplishment of mission baseline science requirements (goal) or minimum science requirements (threshold).

The technical success criteria for each mission is developed and documented in the PLRA as the Baseline Science Requirements and Minimum Science Requirements. Discovery missions must achieve their science requirements while meeting their Mission specific cost cap, as specified in their PLRA.

2.2 PROGRAM SCHEDULE

A summary schedule for the Discovery Program is shown in Appendix D. This schedule will be updated annually to reflect changes and to include new missions and or missions of opportunity selections.

2.3 PROGRAM RESOURCES

Because the Discovery Program consists of a series of independent science missions, the Program resource and workforce levels adjust in accordance with the mission traffic model, which is based upon the program's budget constraints and mission selection rate necessary to maintain the Program launch rate. As such, a benchmark plan dating to the Program's inception in 1992 does not exist. Appendix D contains the Discovery Program budget designated for implementation, along with the current mission traffic model phasing. The total Program budget will be updated annually as part of the NASA Program Operating Plan Process, which is reflected in the Integrated Budget and Performance Document (IBPD).

3.0 PART III: SUBPLANS

3.1 CONTROLS AND COMPLIANCE

3.1.1 DOCUMENTATION CONTROLS AND COMPLIANCE

The Program Manager shall monitor NASA policies, directives, and requirements for changes affecting the Discovery Program. Updates to key top level Program or Project documentation will be directed immediately if required, or performed in annual updates.

The Program Manager shall annually evaluate the need for modifications of the Program Plan and the PCA due to project changes and other activities within the program, or as driven by the above NASA documentation changes. The Program shall update the PCA and Appendix D of this Program Plan whenever budget changes greater than 20 percent (20%) in a given year, or ten percent (10%) within a five-year horizon, occur. Otherwise, changes to the PCA cost, schedule, or technical requirements can be approved by the Discovery Program Manager and Program Director for immediate implementation, and reflected in the next annual document update.

Change control for the Discovery Program and its project documentation will be performed consistent with NASA change control policies and procedures, to enable visibility into all interactions and interdependencies within the Program.

3.1.2 PROJECT REQUIREMENT VALIDATION

Each Discovery project is validated for compliance with Discovery Program requirements through three structured processes: the selection/acquisition process; the mission requirement development process, and the mission project plan review and approval process.

Mission selection and acquisition is performed using an Announcement of Opportunity process, which is based upon the Discovery Program requirements and all applicable NASA requirements. Each proposal is evaluated for compliance with the AO requirements.

Program-level requirements specific to each project (science requirements, launch timeframe, and mission cost cap) are documented in the mission-specific Program Level Requirements Appendix (PLRA). The PLRA is initially drafted by the PI as part of the Concept Study Report, prior to downselect. An updated draft of the PLRA will be provided by the PE to support the mission System Requirements Review (SRR), and will be subsequently baselined (signed) at SRR +30 days. The Discovery Program Office regularly reviews the status and projected ability of each project to meet its approved PLRA. If at any time a project appears unlikely to meet its requirements, it is subject to a special review, and possible cancellation by the AA for SMD.

Each mission is required to develop a mission-unique project plan which defines the approach to the implementation of the project. The plan will be prepared by the PI/Implementing Organization. The project plan will be evaluated for compliance with the requirements of NPG 7120.5C and the Program Plan by the Program Manager. (Note: Discovery projects in assembly and integration as of the effective date of this plan, will be evaluated to NPR 7120.5B).

3.1.3 RESERVES CONTROL

The Program Manager will be responsible for the management and administration of the program implementation budget. The Program Manager will assess the mission projects for significant future cost

threats which could potentially exceed the established project cost caps, and provide them to the Program Director. The Program Manager and Program Director will jointly assess the potential impacts to the Program and Projects to address these threats. The Program Director will deplete Program Futures funding as necessary to address these threats, including delay of future AOs.

Each mission will be required to show a budget reserve posture at the end of phase B, commensurate with the risk associated with the implementation of the mission, but typically no less than 25% of cost to go for costs through the end of Phase D (excluding the cost of the ELV). An appropriate cost reserve for Phase E must be included. The PI and associated Project Manager will have full discretion in applying the cost reserve in a given Fiscal Year within the approved project budget.

3.1.4 INDEPENDENT ASSESSMENTS

Because the Discovery Program was already an existing program of independent projects with established periodic management reporting and budgetary process, no Program Non-Advocate Review (NAR) was performed as required by NPR 7120.5C. Periodic Program Implementation Reviews (PIR) are being conducted on the Program as agreed to by the AA for SMD.

Owing to the high cost and complexity expected of Discovery missions, NASA intends to maintain a significant degree of insight into mission development. The Science Mission Directorate will charter the Discovery Program Office to establish special purpose and standing Independent Assessment Teams (IAT) to evaluate the status of mission progress and risk. The Program Office will coordinate the formation of each IAT with the Program Director and the Program Executive.

3.2 RELATIONSHIPS TO OTHER PROGRAMS AND AGREEMENTS

3.2.1 LAUNCH VEHICLES

Discovery mission investigations may be launched as a primary payload on an expendable launch vehicle (ELV). ELVs may either be provided by NASA with NASA funding or by the proposer as a contribution under a cooperative agreement. Co-manifested or secondary payloads on a domestic or foreign launch vehicle will not typically be considered. Each Discovery AO describes the launch vehicle appropriate for the mission classes included in the announcement. SMD provides launch vehicle funding as part of the total cost cap for each mission.

NASA-procured ELV launch services are included as specified in the applicable AO. The Kennedy Space Center (KSC) has been designated as the lead Center for the acquisition and management of ELV launch services.

3.2.2 OTHER SPACECRAFT

Under specified AOs, Discovery missions may fly as secondary payloads on spacecraft flown under other programs by NASA, other U.S. Government organizations, commercial organizations, or foreign organizations. In particular, Discovery missions of opportunity may include the contribution of an instrument or other mission component to a non-U.S. Government flight mission. NASA Headquarters

will manage the selection of such missions of opportunity and execute international agreements as may be required. The Discovery Program Office will maintain cognizance over the development, implementation, and operations phases of such missions of opportunity as discussed earlier in this document. The Discovery Program Office will work with NASA Headquarters to resolve any inter-organizational issues arising during the implementation phase.

3.2.3 RADIOISOTOPE APPLICATIONS

Radioisotope based sources of electrical power requiring a substantial quantity of nuclear material, such as Multi-Mission Radioisotope Thermoelectric Generators (MMRTGs), are not permitted for Discovery missions. Small radioactive sources, such as radioisotope heater units (RHUs) and/or instrument sources, are permitted on Discovery missions. If RHUs are proposed for a mission that is later selected and confirmed, they will be provided by NASA as Government-furnished equipment (GFE) through the Department of Energy. The costs of the devices will be included as part of the overall mission cost. Any use of such sources will require environmental documentation (see Environmental Quality Regulations, 40 CFR Parts 1500-1508, and others), including timely NEPA documentation and additional approvals for the launch of radioactive materials.

3.3 BUDGET AND ACQUISITION STRATEGY

3.3.1 PRINCIPLES

Key principles to guide the Discovery Program's budget and acquisition approach for projects are:

Project resource constraints and guidelines will be provided within each AO;

Each mission shall estimate the total life cycle cost of all elements needed by the mission. Full cost accounting practices shall be used in developing the total cost to NASA;

Each mission will be required to show a budget reserve posture at the end of phase B commensurate with the risk associated with the implementation of the mission. In no case will the overall budget reserve posture be typically less than 25% of cost to go for costs through the end of Phase D, excluding the cost of the ELV. An appropriate cost reserve for Phase E must also be included;

Each mission shall allocate adequate funds to allow participation by the science community in mission data analysis. In addition, Participating Scientist Programs (PSPs), Data Analysis Programs (DAPs), or Guest Observer (GO) Programs are encouraged and will be supported by Headquarters;

Each mission will develop a Work Breakdown Structure (WBS) in accordance with NPR 7120.5C that best fits its organizational approach and mission design concept;

Independent cost estimates and /or independent review boards will be used to verify estimates provided by the implementing organization when required by the Discovery Program Manager;

One to two percent of the total NASA SMD Cost for the mission (excluding launch vehicles) will be allocated to education and public outreach. E&PO will be coordinated at the Program level to leverage resources and increase efficiency.

3.3.2 BUDGET MANAGEMENT

Discovery Program Operating Plan (POP) Process - Top-level, multi-year Discovery Program budget guidelines will be developed by the MSFC Discovery Program Manager for release through the Program Director. The Program Manager will then work directly with the Project Implementing Organizations to develop budget submittals for each mission. The Program Director will provide the budget submittal for the Discovery Futures budget. The Program Director will be responsible to integrate all budget elements together to form a workable total Program budget and submit it to the AA for SMD for approval. The Program Manager will support the Program Director in advocating and negotiating budget requirements for the Program within the Science Mission Directorate, and in providing supporting information to the NASA Office of the Chief Financial Officer and to the Office of Management and Budget (OMB).

The Program Director and the Program Manager will agree on the top-level breakdown of the budget during the POP process. Once negotiated, the Program Manager will be responsible for the management and administration of the program implementation budget, including the identification of potential Project cost threats against the Discovery Futures Budget. The Program Director will manage and administer the Discovery Futures budget. The Discovery Data Analysis Program and Sample Return Laboratory Instrumentation and Data Analysis Program line items will be managed by the appropriate discipline scientists within SMD. Movement of funds between major Program line items requires approval of the Program Director. Movement of approved implementation budget funds, such as Bypass funding to other agencies and NASA Centers etc., will be based on direction from the Discovery Business Management Office at MSFC to the SMD Business Office. The SMD Business Office will pre-coordinate with the Discovery Business Office, prior to making any changes to the Program implementation budget.

Any Program decision to reallocate funds between program elements will be made only after the net programmatic budget; schedule, science, and risk impacts of those modifications have been assessed and reviewed. In general, unforeseen mission costs will be accommodated through adjustments to mission scope and/or schedule, where consistent with Program priorities.

Earned Value Management (EVM) will not be performed at the integrated Program level, because of the autonomy of the Discovery Projects. For the Discovery Projects, EVM will be required during Phase B, C, & D development activities.

Project Cost Cap Management

Discovery Project budgets are initially estimated in the acquisition process as part of the original mission proposal and subsequent Concept Study Report. The total full cost to NASA for all phases of a Discovery investigation, including the definition, development, launch service, mission operations (including communications costs) and data analysis, and reserves must be included. At confirmation, the mission specific cost cap for the project is documented in the associated PLRA. Changes to this confirmation cost cap will be documented in the associated mission unique Program Funding Agreement (PFA) as follows:

Program driven cost changes: Program approved changes to the mission budget will be reflected in an update to the respective Project unique PFA.

Project driven cost cap breaches: Upon identification of a potential cost cap breach, the project will prepare an assessment of the magnitude, impacts, and any potential options (descope, etc.) to resolve the breach. The Program Office may also elect to perform an independent evaluation of the project issues and cost impacts in parallel with the Project performed assessment. The Project and Program Office will present their findings jointly to the Program Director (or SMD GPMC as directed) for adjudication. The Program Manager must provide a recommendation and supporting rationale for or against proceeding with a Termination Review of the Mission. If the final Program decision is to provide additional funding, the respective Project unique PFA will be revised.

3.3.3 ACQUISITION

The Discovery Program selects missions through a fully-open and competitive process. Investigation teams are to be led by a single principal investigator, with participation open to all categories of organizations, both foreign (generally on a no exchange of funds basis) and domestic, including educational institutions, industry, nonprofit organizations, NASA centers, FFRDCs, and other Government agencies. The PI forms the mission team from any combination of these institutions. In the Discovery AO selection process, multiple investigations are selected for Phase A concept studies, with a competitive downselect to proceed to the phase B part of formulation.

AO development, proposal review, and PI/mission selection are the responsibility of SMD and are carried out to meet the requirements of the Federal Acquisition Regulations (FAR) and the NASA Federal Acquisition Regulations (FAR) Supplement. The Discovery Program Office reviews the draft AO for compliance with Program requirements and to ensure incorporation of lessons learned from current mission development cycles. The LaRC's Science Support Office conducts technical/ management/ cost reviews of proposals in support of the SMD Phase A acquisition selection.

The Discovery Program Office establishes contracts for candidate missions during Phase A, as directed by the Lead Program Scientist. Each Phase A contract will contain a priced option for a bridge phase, which is exercised only upon competitive downselect of an investigation to proceed into Phase B. (The bridge phase covers a short period of Phase B effort to provide project continuity while the Phase B/C/D/E effort is added to the contract). The AO selection provides the full authority necessary to contract with all members of a selected team without further competition for that project. The Discovery Program has established a strategy that contracts for whole missions (Phases B/C/D/E) instead of the usual strategy of separate procurements of each individual phase. Investigations typically will be selected to proceed from one phase to the next through execution of contract options based on successful technical, cost, and schedule performance in previous phases.

Project performance is evaluated in a NASA Confirmation Review at the end of the formulation phase (Phase B), to determine whether to confirm the project to enter the implementation phase (phase C/D). The NASA AA for SMD will make the final decision on mission confirmation.

The Discovery Program Office shall not participate in the competitive evaluation of mission proposals. The Discovery Program Office at MSFC will begin involvement with the mission after competitive selection, at the end of Phase A (Reference Figure 3). In cases where MSFC offices or personnel are involved directly in Discovery proposals, clear and strict firewalls will be established and implemented to separate those activities from the Discovery Program Office personnel.

Discovery projects shall use their best efforts to assist NASA in achieving its goal for the participation of small disadvantaged businesses, women-owned small businesses, Historically Black Colleges and Universities, and other Minority Educational Institutions in NASA procurements. Contracts resulting from

Discovery AOs shall be required to contain a subcontracting plan that includes goals for subcontracting with small, disadvantaged and women-owned small businesses.

3.4 TECHNOLOGY STRATEGY

The inclusion of new technologies to achieve performance enhancements and to reduce total mission cost is encouraged in Discovery proposals provided that appropriate risk mitigation measures are also included. The use of new technologies will enable more aggressive and exciting scientific objectives to be pursued. The teaming of industry, university, and Government is meant to foster an environment conducive to technology development, utilization, and commercialization. The means by which NASA's SMD plans to implement new technology are described in The Space Science Enterprise Integrated Technology Strategy (October 1998). Discovery AOs will require that missions identify their planned technology development/infusion/transfer objectives in the proposal and/or Concept Study Report.

3.5 COOPERATION AND COMMERCIALIZATION

There are commercialization opportunities that may be exploited by organizations developing new instrumentation or other technology for Discovery missions, due to their state-of-the-art nature. Discovery AOs require that missions identify their proposed technology development/infusion/transfer objectives.

3.6 DATA MANAGEMENT AND DISTRIBUTION

The PI-led Discovery mission or Mission of Opportunity science teams shall be responsible for initial analysis of mission data, data delivery to the Planetary Data System (PDS), the publication of scientific findings, and communication of the results to the public.

Proposals and plans must include an adequately funded data analysis period (independent of PDS archiving activities) as part of proposed Phase E activities. Data analysis should be understood to include publication of scientific results of the investigation in peer-reviewed journals.

Data must be made fully public through the PDS, in a usable form, within six months following its collection. Discovery PI teams will be responsible for collecting the scientific, engineering, and ancillary information necessary to validate, calibrate, and reduce the scientific data prior to delivery to the PDS or other wavelength-specific data archive. Archival data products shall include low-level (raw) data, high-level (processed) data, and derived data products such as maps, ancillary data, calibration data (ground and in-flight), documentation, and related software or other tools necessary to interpret the data. All data products shall be documented, validated, and calibrated in physical units usable by the scientific community at large.

In accordance with NASA policy, data are to be released as soon as possible after a brief validation period appropriate for the mission. Each Discovery project shall prepare a science data management plan for approval by the PI, project scientist and the program scientist assigned to that project.

The time required to complete the archiving process shall be the minimum necessary to provide appropriate data to the scientific community and the general public and will be described in the proposal and project plan or data management plan. Any short period for exclusive rights to data, where adequately justified, should be the shortest period consistent with optimizing the science return from the mission and, except under exceptional circumstances, may not exceed six months, since neither any follow-on NASA DAPs nor inclusion in the Discovery DAP will be initiated until the data have been delivered to the PDS or the appropriate wavelength-specific archive in the case of missions engaged in the search for extrasolar planets.

3.7 SYSTEM SAFETY AND MISSION ASSURANCE

Each Discovery project shall have an effective safety and mission assurance program as required by NPR 8700.1 B, NASA Policy for Safety and Mission Success. This program shall include a quality assurance program that is consistent with the SAE AS9100, Quality Systems - Aerospace- Model for Quality Assurance in Design, Development, Production, Installation and Servicing.

Discovery Projects (Payloads) are rated Class B per NPR 8705.4, Risk Classification of NASA Payloads, unless specifically waived. The final classification rating for the mission will be documented in its Program Level Requirements Appendix.

Each mission shall develop and submit a Project Safety and Mission Assurance Plan (this can be included in the Project Plan) for review which complies with DISC-RQMT-002, Discovery Program Safety and Mission Assurance Guidelines and Requirements.

Missions of opportunity shall be developed using their implementing organization's internal quality management system. The mission assurance requirements will be tailored to each project as identified in the proposal submitted in response to the AO (or subsequently amended).

3.8 RISK MANAGEMENT STRATEGY

Every Discovery investigation must define the risk management approach it intends to use to ensure successful achievement of the investigation objectives within established resource and schedule constraints. Included in this discussion of risk management must be risk mitigation plans for new technologies and the need for any long-lead items that need to be placed on contract before the start of Phase C to ensure timely delivery of flight hardware and software, as well as a discussion of the role of potential descope in risk mitigation. Proposals that include international participation must address the risk resulting from any international contributions to the proposed mission. In addition, any manufacturing, test, or other facilities needed to ensure successful completion of the proposed investigation must be identified in every new Discovery proposal.

Technical, management, and cost risks for each Discovery mission will be carefully examined as part of the selection process, and accepted risks are documented in individual project risk processes. All technical and programmatic risks will be reviewed further as part of the project confirmation review, conducted during the PDR time frame, to assure that risks have been reduced to an acceptable level prior to entering detailed design and development. A final review of all accepted risks will be conducted as part of the Flight Readiness Review process.

Since Discovery projects are independent and each is unique, it is understood that each Discovery project may manage risk differently. Each shall have a risk management plan, which may be documented in its Project Plan, consistent with the intent of NPR 8000.4, NASA Risk Management Procedural Requirements. The primary risk management tools for Discovery projects are schedule and financial reserves as well as descoping of mission requirements above the minimum science requirements.

The Discovery Program Office will develop a program risk management plan consistent with NPR 8000.4, NASA Risk Management Procedural Requirements. The Program Office risk process will require the Mission Managers to: (1) Assess significant project identified risks and mitigations for thoroughness, and monitor their resolution; and (2) Independently assess and identify project risks and mitigations. The culmination of these two activities will form the basis for the Program's Risk Based Insight of the projects, where the depth of technical insight applied to ensure project success is proportional to the severity of the known risks and within the balance of the total Program's priorities and limited resources.

3.9 ENVIRONMENTAL IMPACT

All Discovery projects shall conform to NASA policy and procedures (14 CFR Part 1216, Subpart 1216.3 and NPR 8580.1), the National Environmental Policy Act of 1969, as amended (NEPA) (42 U.S.C. 4321 et seq.), and the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508). All Discovery projects shall also comply with the applicable provisions of directives implementing NASA's planetary protection policy in NPD 8020.7, Biological Contamination Control for Outbound and inbound Planetary Spacecraft, and NPR 8020.12, Planetary Protection Provisions for Robotic Extraterrestrial Missions. Additionally, if the mission has the potential to have environmental effects abroad (e.g., launches from a foreign territory) then the mission will require environmental review documentation consistent with NASA policy and procedures for complying with Executive Order 12114 (14 CFR part 1216.321) and NPR 8580.1.

Radioisotope thermoelectric generators (RTG) are not permitted on Discovery missions. Other, smaller radioactive devices, such as RHUs or radioactive sources for science instruments, are permitted, but such usage shall require additional environmental review documentation. Use of an RHU will require an Environmental Assessment or an Environmental Impact Statement to satisfy the NEPA requirements and completion of a detailed and rigorous nuclear safety launch approval process.

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3.10 INSTITUTIONAL AND LOGISTICS

Institutional facility needs, use of existing equipment, as well as project part sparing, are project-unique activities which are to be addressed in the individual Discovery proposals and/or project plans.

Project transportation activities will be addressed in individual Discovery project plans. Transportation in and around the NASA/KSC facility will be provided by KSC, the organization responsible for ground processing at the launch site, and/or the organization providing the launch vehicles. Requirements (i.e., loads and environments) will be levied on the transport and handling processes of structures, subsystems, and instruments by the appropriate cognizant organizations/engineers for each project.

Radioisotope heater units (RHUs), if used, will be transported under the authority of the DoE and the manufacturer.

3.11 PHYSICAL AND INFORMATION TECHNOLOGY SECURITY

Physical and Information Technology Security of each project is the responsibility of the implementing organization. Each Project will work to identify and control threats to personnel and hardware through the use of access control and other safeguards. The Project must establish appropriate security procedures that meet the intent of NPR 1600.1, NASA Security Program Procedural Requirements. Each project must also protect the integrity, availability, and confidentiality of project information systems, software applications, data, and information generated within their projects through the implementation of a security plan that meets the intent of NPR 2810.1, Security of Information Technology, and NPR 2810.1C, NASA Information Security Policy.

The Astromaterials Curator at the Johnson Space Center is responsible for the physical security, documentation, inventory accountability, environmental preservation, and distribution of any returned samples delivered to the Curation Facility.

3.12 VERIFICATION AND VALIDATION

Performance of Discovery flight elements shall be verified by the individual projects through a combination of analysis, inspection, demonstration, similarity, and test, with particular emphasis on incremental, integrated, and concurrent testing. Specific verification of spacecraft system, ground system, and payload elements are the responsibility of the Project. The launch vehicle supplier shall be responsible for physical integration of the spacecraft with the launch vehicle, and for verifying the integrated system integrity. The project shall be responsible for the end-to-end flight/ground system performance verification. Verification by test, rather than analysis, will be encouraged.

Software assurance is a fundamental part of the concurrent flight/ground engineering process, and shall be detailed in project software management plans. Independent software verification and validation services will be procured from the NASA Independent Verification and Validation Facility in Fairmont, West Virginia, as specified in project V&V plans.

3.13 REVIEWS

3.13.1 PROGRAM REVIEWS

Because the Discovery Program is an existing level-of-effort program with independent projects, the periodic management reporting and annual budgetary process provide adequate program evaluation. Periodic Program Implementation Reviews (PIR) will be conducted on the Program as agreed to by the AA for SMD.

3.13.2 PROJECT REVIEWS

Table 2 below identifies the minimum reviews associated with a Discovery mission, along with the Control Authority for each review. Each mission project shall establish a specific set of reviews and their associated timeline in their Project Plan, which ensures that the Project is ready to proceed to the next phase. The project's review plan may include additional reviews as directed by the implementing organization GPMC or Senior Board.

TABLE 2: DISCOVERY PROJECT REVIEWS

Review	Program Office Involvement	Control Authority
System Requirement Review (SRR)	Review Board Member	GPMC or Appointed Board at the Project Implementing Organization
Confirmation Assessment (CA)	Participate in the debrief	Independent Assessment Team
Confirmation Readiness Review (CRR)	Participate in the open session	GPMC or Appointed Board at the Project Implementing Organization
Confirmation Review (CR) and Authority to Proceed	Ad hoc member of the SMD PMC for the review	AA for SMD
Preliminary Design Review (PDR)*	Review Board Member	GPMC or Appointed Board at the Project Implementing Organization
Critical Design Review (CDR)*	Review Board Member	GPMC or Appointed Board at the Project Implementing Organization
Mission Readiness Review (MRR)	Review Board Member	GPMC or Appointed Board at the Project Implementing Organization
Mission Readiness Briefing (MRB)	Provide independent certification of flight readiness Ad hoc member of the SMD PMC for the review	AA for SMD
Flight Readiness Review (FRR)	Board Member	NASA Launch Manager or designee
Launch Readiness Review (LRR)	Board Member	NASA /HQ AAA for Launch Services and the Spacecraft Mission Director
Termination Review (as directed)	Ad hoc member of the SMD PMC for the review	AA for SMD

*Independent Assessment Teams will monitor and report on these Project Reviews

The Mission's review process, which can be tailored to the particular project, must comply with DISC-RQMT-002, Discovery Program Safety and Mission Assurance Guidelines and Requirements. Figure 3 provides a notional view of the typical review process. The Discovery Program Office shall participate in all project reviews.

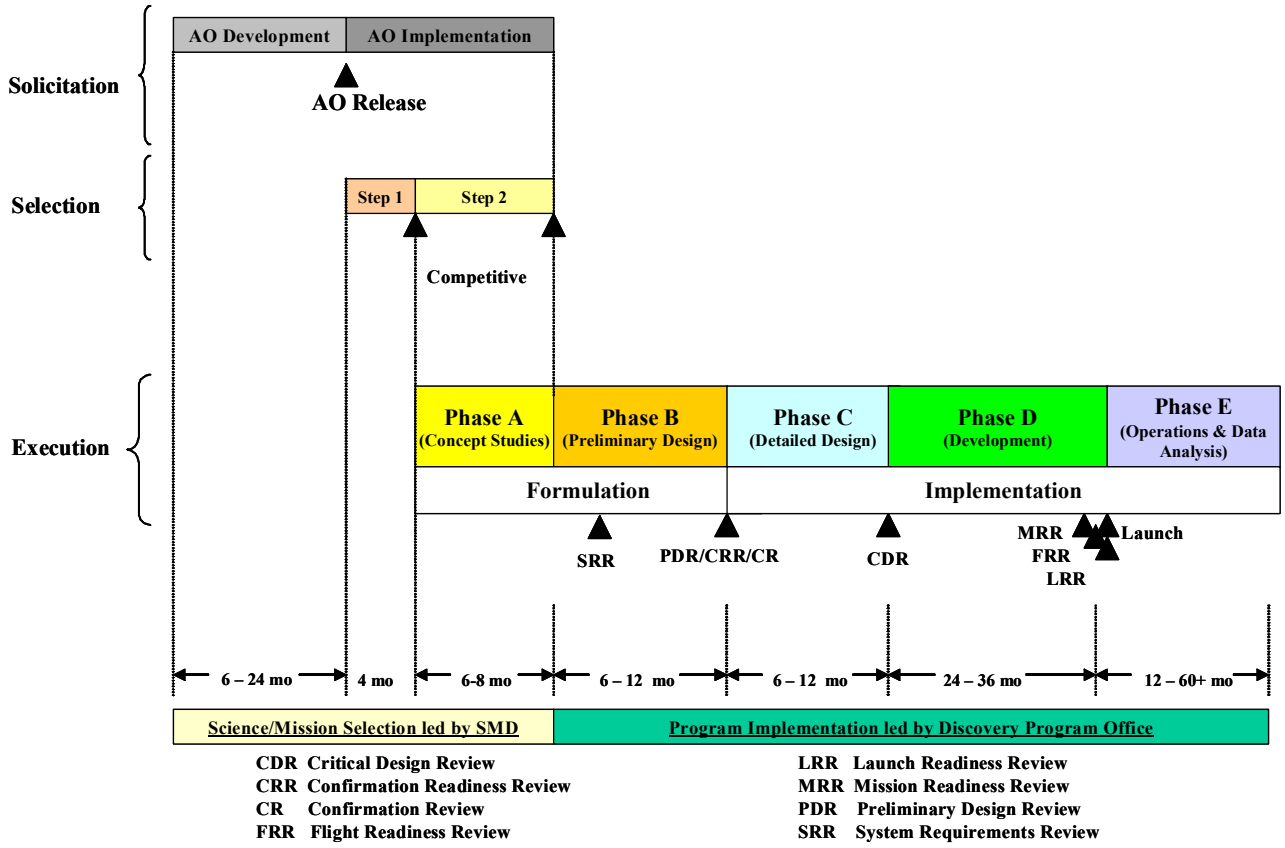

FIGURE 3: DISCOVERY PROJECT LIFE CYCLE

3.13.3 PROJECT REPORTING REQUIREMENTS

Each Discovery project is required to report to the Discovery Program Manager as shown in Table 3. The Program Office will conduct reviews of each assigned project for technical, cost, schedule, and risk performance.

TABLE 3: PROJECT REPORTING REQUIREMENTS

Forum	Report	Schedule
Quarterly Project Reviews	Technical Progress, Cost, Schedule	Quarterly
Monthly Project Status Reviews	Technical Progress, Cost, Schedule	Monthly
Weekly Status Reports	Electronic Weekly Progress Report	Weekly

3.14 EDUCATION AND PUBLIC OUTREACH

Contributing to the improvement of science education and the public understanding of science are explicit goals of the Discovery Program and of SMD as a whole. The Discovery Program is committed to incorporating program elements directed toward informing the public and providing educational opportunities that support local, state, regional, and national educational objectives and reform efforts. A substantive education/outreach program shall be an integral element of every Discovery project and the PI shall devote adequate resources to the planning and implementation of such an effort. In accord with the policies outlined in Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy (October 1996), a guideline of 1 to 2% of the total project budget (excluding launch vehicle costs) shall be allocated to education and outreach. The approach for each project's outreach program should be consistent and coordinated with the outreach program for the relevant SMD science theme. Discovery Program AOs require that each PI document in his/her proposal his/her approach for planning an education/outreach program. Costs for such activities must be phased as a part of the mission costs.

3.15 TERMINATION REVIEW CRITERIA

The Discovery Program Director will utilize the following criteria in evaluating the need to perform a Termination Review of the Discovery Program or a Discovery Project:

Program Criteria: Inadequate Program funding profile to maintain consecutive mission development

Project Criteria: The Project cannot demonstrate the ability to meet the minimum science objectives within the stated cost cap

3.16 DEVIATIONS AND WAIVERS

See the enclosed Appendix C Compliance Matrix.

3.17 CHANGE LOG

REV.	DESCRIPTION	PUB. DATE
-	Initial Baseline	**9/99**
A	General update to reflect new Discovery Program Goals-Requirements-Outcomes, Program Office changes, NASA policy changes, and new NASA requirements enunciated in NPR 7120.5C, and 2005 PIR findings	**9/05**

3.18 APPENDICES

A: Acronyms and Abbreviations

B: Reference Documents

C: Compliance Matrix

D: Discovery Program Budget and Summary Schedule

APPENDIX A - ACRONYMS AND ABBREVIATIONS

AA	Associate Administrator
AAA	Assistant Associate Administrator
APL	Applied Physics Laboratory (Johns Hopkins University)
AO	Announcement of Opportunity
CA	Confirmation Assessment
CDR	Critical Design Review
CRR	Confirmation Readiness Review
DoE	U.S. Department of Energy
ELV	Expendable Launch Vehicle
E/PO	Education and Public Outreach
EVM	Earned Value Management
FAR	Federal Acquisition Regulations
FFRDC	Federally Funded Research and Development Center
FRR	Flight Readiness Review
GPMC	Governing Program Management Council
IAT	Independent Assessment Team
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
KSC	Kennedy Space Center
LaRC	Langley Research Center
LCC	Life Cycle Cost
LRR	Launch Readiness Review
MO	Mission of Opportunity
MOR	Mission Operations Review
MOU	Memorandum of Understanding
MRR	Mission Readiness Review
NAR	Non Advocate Review
NEPA	National Environmental Policy Act
NMO	NASA Management Office
NOA	New Obligation Authority

NRA	NASA Research Announcement
OMB	Office of Management and Budget
PCA	Program Commitment Agreement
PDR	Preliminary Design Review
PER	Pre-Environmental Review
PFA	Program Funding Agreement
PI	Principal Investigator
PIR	Program Implementation Review
PLRA	Program Level Requirements Appendix
PMC	Program Management Council
POP	Program Operating Plan
PSLA	Project Service Level Agreement
PSR	Pre-Ship Review
R&A	Research and Analysis
RHU	Radioisotope Heater Unit
SBIR	Small Business Innovative Research
SMD	Science Mission Directorate
SRR	System Requirements Review
SSO	Science Support Office (NASA LaRC)
TBD	To Be Determined
V&V	Verification and Validation

APPENDIX B – REFERENCE DOCUMENTS

National Aeronautics and Space Administration (NASA) Procedures and Requirements (NPR) 7120.5C

Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy (October 1996)

Environmental Quality Regulations, 40 CFR Parts 1500-1508

Quality Systems - Aerospace- Model for Quality Assurance in Design, Development, Production, Installation and Servicing, SAE AS9100

Discovery Program Safety and Mission Assurance Guidelines and Requirements, DISC-RQMT-002

Risk Classification of NASA Payloads, NPR 8705.4

NASA Policy for Safety and Mission Success, NPD 8700.1

NASA Risk Management Procedural Requirements, NPR 8000.4

Biological Contamination Control for Outbound and Inbound Planetary Spacecraft, NPD 8020.7

Planetary Protection Provisions for Robotic Extraterrestrial Missions, NPR 8020.12

NASA Information Security Policy, NPR 2810.1C

NASA Security Program Procedural Requirements, NPR 1600.1

Implementing the National Environmental Policy Act and Executive Order 12114, NPR 8580.1

The National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321 et seq.

Biological Contamination Control for Outbound and inbound Planetary Spacecraft, NPD 8020.7

Planetary Protection Provisions for Robotic Extraterrestrial Missions, NPR 8020.12

Executive Order 12114 (14 CFR part 1216.321)

NPR 7120.5 C APPENDIX K. Compliance Matrix

NOTE: For non-compliance, approved deviation(s) and/or waiver(s) must be attached

Program/Project Name:	**Date:**	
Program/Project Manager:		
Requirement	**Compliant (Yes/No)**	**Notes:**
2 CHAPTER 2. Program Management Requirements		
2.1 Four-Part Program Management Process		
2.1.a As a strategic management structure, the program construct is extremely important within NASA. Programs provide the critically important linkage between the Agency's ambitious goals and the projects that are the instruments for achieving them. Programs vary significantly in scope, complexity, cost, and criticality; however, a properly designed and executed program structure inevitably contributes to sound project management being embraced and practiced at lower levels. To initiate individual programs, a Mission Directorate (or Mission Support Office) **shall** prepare a program Formulation Authorization Document (FAD).	**Yes**	The Program has been authorized and in implementation since 1992
2.1.b The Program Manager is responsible for ensuring that program goals address the Mission Directorate Strategies and Mission Support Office Functional Leadership Plans and that the program's content, which may contain multiple product lines, addresses those program goals. The Program Manager **shall** be responsible for recommending to the MDAA (or MSOD) the appropriate product line for each project in his/her program. The Program Manager coordinates program content with the Mission Directorate (or Mission Support Office), provides leadership, and is responsible for the successful accomplishment of the program that meets the needs of the customer. This chapter further delineates the management requirements for programs, described in terms of the four-part management process of paragraph 1.7.1. Program Managers **shall** meet all requirements outlined in this chapter *irrespective of the size of the program*.	**Yes**	Program content regarding project definition on Discovery Missions is defined in a competitive selection process using an Announcement of Opportunity
2.2 Program Formulation	----------	

Program/Project Name:	**Date:**	
Program/Project Manager:		
Requirement	**Compliant (Yes/No)**	**Notes:**
2.2.1 Purpose: The purpose of program formulation activities is to establish a cost-effective program that is demonstrably capable of meeting Agency and Mission Directorate (or Mission Support Office) goals and objectives. The program Formulation Authorization Document (FAD) authorizes a Program Manager to initiate the planning of a new program, and to perform the analyses required to formulate a sound Program Plan. A FAD template is found in Appendix A. The PCA is the agreement between the MDAA (or MSOD) and the NASA Deputy Administrator that authorizes transition from formulation to implementation. A PCA can be considered an executive summary of the Program Plan. A PCA template is found in Appendix B.	**N/A**	Discovery was an existing program with a PCA when NPG7120.5A invented the FAD. Since the PCA, when written, essentially replaces the FAD as the top level definition of a program, no FAD was generated. OCE agreed with this position at that time.
2.2.2 Requirements: During program formulation, the Program Manager, once selected, **shall**:	**----------**	
2.2.2.a **Prepare a Program Plan.**	**Yes**	
(1) In the Program Plan, the Program Manager **shall** define and document an affordable program architecture along with the success criteria and performance metrics. (A Program Plan template is provided in Appendix C.) Specifically, the Program Manager **shall**:	**Yes**	
(i) Ensure that top-level requirements, including success criteria, for each constituent project are defined in coordination with the Mission Directorate (or Mission Support Office) and documented in the Program Plan.	**Yes**	Performed using an Announcement of Opportunity process and the PLRA
(ii) Ensure the validated top-level requirements and program success criteria flow down to projects or portfolios. Program Managers are required to demonstrate this linkage (traceability) while formulating and implementing a program, and this linkage will be closely monitored when the Program Plan is reviewed.	**Yes**	Discovery missions are individually selected in the AO process, with definitive Level I requirements documented in Appendices to the Program Plan
(iii) Prepare estimates of yearly New Obligational Authority (NOA) consistent with top-level program requirements, and identify the civil service workforce so as to enable full cost estimates.	**Yes**	Program is currently in implementation phase, with NOA and CS workforce documented in the IBPD.
(iv) Prepare an overall program timeline with key milestones related to the accomplishment of program goals and objectives. When applicable, the timeline should provide guidance and a schedule for the announcement of new project (or research) opportunities.	**Yes**	
(v) Document synergistic activities with other NASA, industry, academia, and international programs.	**Yes**	

Program/Project Name:	**Date:**	
Program/Project Manager:		
Requirement	**Compliant (Yes/No)**	**Notes:**
(vi) Prepare and implement a comprehensive Safety and Mission Assurance (SMA) Plan early in program formulation to ensure program compliance with all regulatory safety requirements from OSHA and all NASA Safety and Mission Assurance requirements such as mishap reporting and investigation, range safety, software safety and assurance, and human rating requirements. The importance of up-front safety, reliability, maintainability, and quality assurance requirements should be emphasized in all program activities.	**Yes**	The Program has been in implementation since 1992, but a Program level SMA Plan did not exist during formulation. Instead, regulatory compliance was achieved through the AO process, and through existing NASA Center and contracting processes. A Program Level SMA Plan has been added as a program document in the program plan, and is in development.
(2) Beginning early in program formulation, the Program Manager **shall** work with the Office of External Relations, the Deputy Chief Acquisition Officer, and the MDAA (or MSOD) to identify potential non-NASA partners and necessary agreements for international or interagency cooperation.	**N/A**	Assumption is that the required process in effect at the time was used to properly authorize and coordinate the Program. The Program has been in implementation since 1992
(i) All activities and documentation **shall** be consistent with policy directives and with Mission Directorate (or Mission Support Office) and Agency-level agreements with the partners.	**Yes**	
(ii) All program-enabling commitments **shall** be obtained prior to program approval for implementation.	**Yes**	Assumption is that the required process in effect at the time was used to properly authorize and coordinate the Program. The Program has been in implementation since 1992
(3) The Program Manager **shall** evaluate lessons learned from existing and previously executed programs and projects to identify applicable lessons for use in program planning and execution.	**Yes**	
(4) Early in program formulation, the Program Manager, in consultation with the MDAA (or MSOD), **shall** recommend a Technical Warrant Holder (TWH). The NASA Chief Engineer selects the TWH.	**Yes**	TWH for each System (Project) in the Discovery Program are assigned on a case by case basis, based upon safety considerations.
2.2.2.b **Create a program organizational and financial structure.**	**----------**	
(1) The Program Manager **shall** build a program organizational structure that assigns clear lines of responsibility, authority, and accountability to specific Centers, Project Managers, partners, advisory groups, and oversight boards.	**Yes**	

Program/Project Name:	**Date:**	
Program/Project Manager:		
Requirement	**Compliant (Yes/No)**	**Notes:**
(2) Working in close cooperation with the OCFO, the Program Manager **shall** be responsible for creating financial management structures that comply with budget and accounting standards established by that Office.	**Yes**	This is a function that is shared with the SMD Program Director
2.2.2.c **Develop a program technical approach.**		
(1) As applicable, the Program Manager **shall** identify scientific and engineering research and development strategies, develop constituent project (systems and operations) concepts, acquisition strategies, technology strategies, commercialization plans, agreements (e.g., space operations service agreements, launch services agreements, safety and mission assurance agreements) and logistics concepts, and incorporate them into the Program Plan. The most important aspect of this formulation activity is conducting a thorough analysis of alternatives (AoA), relying on architecture frameworks, program-level systems engineering, design reference mission analysis, and other formal techniques.	**Yes**	Non Applicable. Discovery is an ongoing multi-mission program, of competitively selected science missions.
(2) The Program Manager **shall** establish the program's methods for advanced technology insertion and validation, safety and mission assurance, environmental impact assessment, records and data management and distribution, physical and information security and program protection, and risk management, and incorporate them into the Program Plan.	**Yes**	
(3) The Program Manager **shall** incorporate the security considerations in NIST Special Publication 800-64, "Security Considerations in the Information System Development Life Cycle" in the lifecycle of all Information Technology related Programs.	**N/A**	The Discovery Program is not an Information Technology related Program.
2.2.2.d **Develop a continuous risk management process**	**----------**	
(1) The Program Manager **shall** develop and implement a continuous risk management process (that includes integrated risk management planning for all risks associated with program safety, cost, schedule, and technical performance), and document it in a program Risk Management Plan.	**Yes**	

Program/Project Name:	**Date:**	
Program/Project Manager:		
Requirement	**Compliant (Yes/No)**	**Notes:**
(i) The Program Manager **shall** begin the process with risk identification and an assessment of program constraints, which defines the acceptable risks. Areas of potential program risks include, but are not limited to: mission success criteria; development schedule; budget limits; launch window and vehicle availability; international partner participation; critical single source suppliers; security; environmental concerns; human space flight safety issues; fail ops/fail safe requirements; safe and reliable operations; and the amount and type of testing.	**Yes**	
(ii) The Program Manager **shall** follow the NASA Continuous Risk Management (CRM) Process, shown as Figure 2-1 and Figure 3-2 in Chapter 3.	**Yes**	
(iii) The program Risk Management Plan **shall** describe periodic risk reviews, system safety, quantitative risk assessments, operations risk management, risk-based acquisition management, and information management systems for problem reporting, surveillance reporting, supportability data and trends analyses	**Yes**	This is performed on an individual Project basis, as the Projects are independent.
(2) All risks **shall** be documented and communicated throughout the program life cycle.	**Yes**	This is typically performed on an individual Project basis, with the Program performing risk based insight analysis
(3) The results of the risk management process **shall** be incorporated into the final technical products.	**Yes**	This is primarily performed on an individual Project basis.
2.2.2.e **Develop a closed-loop problem tracking process that includes problem or anomaly reporting, problem analysis, and corrective action.**	----------	
(1) The Program Manager **shall** develop a protocol to review past performance to determine the incidence of identical or related anomalies.	**Yes**	
(2) The Program Manager **shall** develop an escalation procedure (to inform higher levels of management) based on mission criticality.	**Yes**	
(3) The Program Manager **shall** develop a closeout process for root cause determination, anomaly mitigation, and recurrence control.	**Yes**	This is performed on an individual Project basis.
(4) The Program Manager **shall** evaluate and disposition Government-Industry Data Exchange Program (GIDEP) Alerts, Safe-Alerts, Problem Advisories, Agency Action Notices and NASA Advisories, and **shall** exchange significant problem and nonconforming item data with other activities and with GIDEP.	**Yes**	This is performed on an individual Project basis.

Program/Project Name:	**Date:**	
Program/Project Manager:		
Requirement	**Compliant (Yes/No)**	**Notes:**
2.2.2.f **Present the Program Plan for approval by the MDAA (or MSOD).**	----------	
(1) Prior to the program Non-Advocate Review (NAR), the Program Manager **shall** secure Program Plan concurrence by the cognizant MDAA (or MSOD) and from those Center Directors committing support to the program.	**Yes**	Assumption is that the required process in effect at the time was used to properly authorize and coordinate the Program. The Program has been in implementation since 1992
(2) For single-project programs, the Program Manager **shall** either prepare both a Program Plan and a Project Plan, or integrate key elements of the Program Plan with all required elements of the Project Plan. The resultant Program Plan should fully meet the requirements described for both the program and project plans, including adequate linkage to the Agency Vision, goals, and objectives.	**N/A**	This is not a single project program.
(i) For the purposes of compliance with this document, formulation and implementation activities for single-project programs **shall** follow the requirements outlined for projects.	**N/A**	This is not a single project program
(ii) A Formulation Authorization Document (FAD) and a Program Commitment Agreement (PCA) **shall** be required for a single-project program.	**N/A**	This is not a single project program. The Program has a PCA in effect.
2.2.2.g Support the Mission Directorate or the (Mission Support Office) in the preparation of a Program Commitment Agreement, based on the content of the Program Plan.	**Yes**	
2.3 Program Approval		
2.3.4 Requirements: In support of Agency PMC decision review meetings during program approval:	----------	
2.3.4.a The Program Manager **shall** support evaluation by IPAO in accordance with the program evaluation process. (See paragraph 2.5.8 for more detailed requirements.)	**Yes**	
2.3.4.b The Program Manager **shall** prepare a program readiness overview briefing for presentation at the Agency PMC milestone decision review meeting that includes a summary of the program, the status of program documentation and products, concurrence of the TWH on technical requirements (including all variances), and significant risks, all appropriate to the level of program maturity.	**Yes**	Performed as required.
2.3.4.c The Program Manager **shall** prepare (and/or submit) the program documents and products described in Table 2-2. For programs that have a preliminary NAR, an updated FAD is not needed for the NAR.	**Yes**	

Program/Project Name:	**Date:**	
Program/Project Manager:		
Requirement	**Compliant (Yes/No)**	**Notes:**
2.3.4.d At that meeting, the IPAO results and findings, including an Independent Cost Analysis (ICA), are also presented. The Program Manager **shall** then follow with a presentation of responses to the IPAO findings.	**Yes**	
2.4 Program Implementation		
2.4.2 **Program Control**	----------	
2.4.2.2 Requirements: During implementation, the Program Manager **shall**:	----------	
2.4.2.2.a Have a signed PCA before conducting activities associated with program or program element (project or portfolio) implementation.	**Yes**	
2.4.2.2.b Demonstrate a comprehensive program control function.	----------	
(1) The program control function **shall** operate to ensure that cost, schedule, safety, and performance commitments made at the program and project levels are demonstrable in terms of agreed-upon metrics.	**Yes**	
(2) The Program Manager **shall** focus attention on assuring that projects are operating within the framework of the approved Program Plan.	**Yes**	
(3) The Program Manager **shall** monitor any program element reserves held at the program level and distribute them, as needed, to meet program goals and objectives.	**Yes**	
2.4.2.2.c Prepare and maintain detailed budgets, work authorizations, plans, and schedules.	**Yes**	
(1) The Program Manager **shall** provide a copy of the signed PCA to the OCE and OCFO.	**Yes**	
(2) The Program Manager **shall** support the Mission Directorate (or Mission Support Office) in updating the PCA through a revision when new content is added to the program (e.g., the creation of a new project); the revision **shall** be noted in the PCA change log.	**Yes**	
(3) The Program Manager **shall** evaluate the need for modifications of the Program Plan and the PCA due to changes in projects and activities within the program. Programs are usually long-lived constructs and should not require extensive modification during implementation. However, external funding changes or strategic shifts within the Agency can generate modifications to the PCA. Specifically, for ongoing programs:	**Yes**	

Program/Project Name:	**Date:**	
Program/Project Manager:		
Requirement	**Compliant (Yes/No)**	**Notes:**
(i) The Program Manager **shall** support the Mission Directorate (or Mission Support Office) in updating the PCA through a modification when budget changes greater than 20 percent (20%) in a given year, or ten percent (10%) within a five-year horizon, occur.	**Yes**	
(ii) The Program Manager **shall** support the Mission Directorate or (Mission Support Office) in preparing the PCA modifications and documenting them in the PCA change log. The Mission Directorate will approve the modifications and take the modified PCA to the Agency PMC for an approval recommendation to the Deputy Administrator.	**Yes**	
(iii) The Program Manager **shall** support the Mission Directorate (or Mission Support Office) in preparing a briefing for the Agency PMC that describes factors driving the modification and **shall** support the briefing if requested. When the Deputy Administrator signs the modified PCA, the program modification is approved.	**Yes**	
(4) Budget data **shall** reflect, at all times, the full cost of implementing all aspects of the program. (For more information on full cost and practices, see Volume 7 of the NASA Financial Management Requirements.)	**Yes**	
(5) The Program Manager **shall** prepare and maintain a detailed schedule of program milestones and major planned events. Program Managers are encouraged to identify alternative development paths in order maximize the probability of success.	**Yes**	
(6) The Program Manager **shall** review and approve constituent Project Plans.	**Yes**	
2.4.2.2.d **Oversee acquisition efforts.**	**----------**	
(1) The Program Manager shall ensure that all acquisition efforts[1] and other transactions are implemented in accordance with Federal law and regulations (including the FAR or OMB Circulars, as applicable), and the NASA FAR Supplement, NASA directives, and the Program Plan.	**Yes**	This activity is performed by the Discovery Program Director.

[1] This includes contracts, grants, cooperative agreements, interagency agreements, Space Act Agreements, and any effort not performed by NASA installation employees.

Program/Project Name:	**Date:**	
Program/Project Manager:		
Requirement	**Compliant (Yes/No)**	**Notes:**
(2) The Program Manager **shall** ensure that standards and requirements flow down to external parties (i.e., contractors, grantees, and non-NASA parties to Space Act and other agreements and non-procurement instruments).	**Yes**	
2.4.2.2.e **Conduct an integrated continuum of reviews.** The Program Manager **shall** conduct the internal program reviews during implementation as specified in the Program Plan.	**Yes**	
2.4.2.2.f **Disposition all risks before delivery to operations (or the equivalent for a technology program).**	**Yes**	
2.4.2.2.g **Support the Mission Directorate (or MSO) in preparing material for Quarterly Status Reviews (QSRs) to the Agency PMC.**	**Yes**	
2.4.2.2.h **Periodically evaluates the performance of Project Managers and their teams.**	**Yes**	This is currently achieved through contract performance reviews.
2.4.3 **Program Advocacy**	**----------**	
2.4.3.2 Requirements: During implementation, the Program Manager **shall**:	**----------**	
2.4.3.2.a Advocate and promote customer involvement in the implementation of the program to assess progress against commitments.	**Yes**	
2.4.3.2.b Produce and execute a plan for education and public outreach by working with Mission Directorate education leads and the NASA Office of Education.	**Yes**	
2.4.4 **Program Integration**	**----------**	
2.4.4.2 Requirements: During implementation, the Program Manager **shall**:	**----------**	
2.4.4.2.a Maintain the continuity of requirements by ensuring that requirements are fully traceable from Agency vision and goals down through program requirements and top-level project requirements.	**Yes**	
2.4.4.2.b Ensure that the program is being implemented in a cost-effective manner by continuing to conduct architecture trades, technology assessments, mission analyses, and infrastructure and operational analyses that help structure program-level investments for maximum return.	**Yes**	Performed using competitive AO process.

Program/Project Name:	**Date:**	
Program/Project Manager:		
Requirement	**Compliant (Yes/No)**	**Notes:**
2.4.4.2.c Ensure that all investment areas (product lines) associated with the program are being managed in an integrated manner so that changes in one program investment area are reflected in all other related investment areas.	**Yes**	Projects are totally independent.
2.4.4.2.d Ensure that all cross-cutting management elements of the program (e.g., safety, technology strategy, risk management) are being implemented in constituent projects in accordance with the Program Plan.	**Yes**	
2.4.4.2.e Identify and secure facilities, infrastructure, equipment (including GFE), materials, supporting personnel, and services that are required to support multiple projects within the program.	**Yes**	
(1) The Program Manager **shall** negotiate agreements with support providers, as needed.	**Yes**	
(2) For those products requiring transfer of custodial responsibility, the Program Manager **shall** ensure that acceptance/turnover activities, licensing, and documentation are addressed.	**Yes**	
(3) The Program Manager **shall** ensure that Project Plans account for the disposition of assets (orbital and other) after the end of their useful life	**Yes**	
(4) The Program Manager **shall** manage all salvageable assets (e.g., spares) remaining at the end of a constituent project's life cycle.	**Yes**	
2.5 Program Evaluation		
2.5.8 Requirements: To accomplish the on-going program evaluation process, the Program Manager **shall**:	----------	
2.5.8.a Plan program team and schedule resources to support Independent Assessment (IA) for all required program decision reviews and Program Implementation Reviews (PIRs) (nominally every two years after the NAR approval). For initial planning purposes, the Program Manager should consult Table H-2 in Appendix H. The program's planning schedule may be modified through negotiation with the IPAO.	**Yes**	
2.5.8.b Comply with the evaluation Terms of Reference (ToR) for all independent reviews.	**Yes**	

Program/Project Name:	**Date:**	
Program/Project Manager:		
Requirement	**Compliant (Yes/No)**	**Notes:**
(1) The ToR is prepared by the IPAO through negotiation with the MD (or MSO) point-of-contact. The ToR is approved by the OCE and the MDAA (or MSOD). The ToR specifies the details of conducting site field review events, including the schedule, deliverable items and areas of program risk. If the MD (or MSO) point-of-contact and the IPAO cannot agree on the ToR scope and content, the OCE **shall** be the final decision authority.	**Yes**	
(2) The final schedule **shall** be documented in the evaluation Terms of Reference (ToR).	**Yes**	
2.5.8.c Prepare program briefings and material demonstrating the program's readiness to continue, and present them at the IPAO site field review. These briefings **shall** include a program cost estimate. (PIRs are designed to measure program performance and compare that performance against the Program Plan. Consequently, the biennial PIR focuses on program activities and generally does not delve into project operations. The Program Manager should, however, plan for some level of project-level analysis in order to assess the delivery of products and services according to the agreed-upon metrics in the Program Plan.) The Program Manager should consult Table H-1 in Appendix H for other assessment criteria.	**Yes**	
2.5.8.d Review facts, assumptions, and findings of the initial IPAO briefing, and provide a formal response to the IPAO.	**Yes**	
2.5.8.e Comply with external requests for evaluation and audit (e.g., the Congress, OMB, the NASA Inspector General, GAO, etc.).	**Yes**	
2.5.8.f Support any additional independent reviews or technical assessments that may be required during formulation and implementation as directed by the Administrator, Agency PMC, MDAA, MSOD, the OCE (including the NESC), or the Office of Safety and Mission Assurance. The Program Manager **shall** provide formal responses to action items/recommendations from these reviews for closure.	**Yes**	
2.5.8.g Ensure that program engineering data related to failures, anomalies, evaluations, problems, incidents, and Requests for Action (RFAs) are captured, retained, and made available to the TWH and NESC upon request.	**Yes**	

Program/Project Name:	**Date:**	
Program/Project Manager:		
Requirement	**Compliant (Yes/No)**	**Notes:**
2.5.8.h Provide support for a Safety and Mission Assurance Readiness Review (SMARR) prior to any launch or safety critical event or other activity selected by the Chief SMA Officer.	**Yes**	