SOLAR TERRESTRIAL PROBES (STP) PROGRAM

Program Plan

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National Aeronautics and Space Administration

Goddard Space Flight Center

Greenbelt, Maryland

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Solar Terrestrial Probes (STP) Program

1.0 PROGRAM OVERVIEW

1.1 INTRODUCTION

Our solar system is governed by the Sun, a main-sequence star midway through its stellar life. The Sun's influence is wielded through gravity, radiation, the solar wind, and magnetic fields as they interact with the masses, fields, and atmospheres of planetary bodies. The variability of the Sun has significant impacts on life and technology that are felt here on Earth and throughout the solar system. Heliophysics is the comprehensive term for the study and exploration of the Sun, its effects on Earth and the planets of the solar system, and space environmental conditions and their evolution. The Sun and its effects on changing planetary atmospheres and operations in space are called space weather; that is, space weather is defined as the conditions on the Sun and in the solar wind, magnetosphere, ionosphere, and thermosphere that can influence the performance and reliability of space-borne and ground-based technological systems and endanger human life or health. Through the eyes of multiple spacecraft, we see our solar system as a "heliosphere," a single, interconnected system moving through interstellar space. On Earth, this interaction with our star is experienced through space weather's effects on radio and radar transmissions, electrical power grids, and spacecraft electronics, through modifications to the ozone layer, and through climate change.

STP missions focus on specific scientific areas required to advance our fundamental understanding of the Sun – Solar System connection. Successive missions target the "weakest links" in the chain of understanding. The missions use a creative blend of *in situ* and remote sensing observations, often from multiple platforms, to understand the causes and effects of solar variability over the vast spatial scales involved in planetary and heliospheric responses.

The STP program has successfully developed and launched the Thermosphere Ionosphere Mesosphere Energetics and Dynamics (TIMED), Hinode (previously identified as "Solar-B"), and Solar Terrestrial Relations Observatory (STEREO) missions.

The TIMED mission completed its full mission success criteria as planned, the outcomes provided are (1) the characterization of seasonal and latitudinal variations, in the altitude layer 60-180 km, of the temperature, density and partial pressure of O and N2, the average horizontal neutral wind velocity, and the distribution of infrared emissions of CO2, O3, NO and OH; (2) daily measurements of the extreme ultraviolet solar irradiance; and (3) a determination of the relative importance of the radiative, chemical, electrodynamical and dynamical sources and sinks of energy for the thermal structure of the referenced altitude layer.

The STEREO mission completed its full mission success criteria as planned, the outcomes provided are (1) new understanding of the causes and mechanisms of coronal mass ejection (CME) initiation; (2) characterizations of the propagation of CMEs through the heliosphere; (3) new insights into the mechanisms and sites of energetic particle acceleration in the low corona

and the interplanetary medium; and (4) the development of a 3D time-dependent model of the magnetic topology, temperature, density, and velocity structure of the ambient solar wind.

The Hinode mission completed its full mission success criteria as planned, the outcomes provided are (1) detailed studies of the solar magnetic field structure, evolution and change; (2) a determination that the quasi-steady state magnetic field plays an active role in coronal heating; (3) a determination that the solar cycle spectral irradiance variation has a magnetic origin; (4) unambiguous evidence for the presence of magnetic reconnection in the restructuring of the coronal magnetic field in transient events; and (5) a determination of the inter-dependence of network and intra-network magnetic structure and activity.

The Magnetospheric Multiscale (MMS) mission is in implementation. Because the STP program is an ongoing program, definition of the sequence and content of additional missions will occur in the future, based upon the National Aeronautics and Space Administration's (NASA's) strategic planning activities.

1.2 GOALS AND OBJECTIVES

The STP program addresses fundamental science questions about the physics of space plasmas and the flow of mass and energy through the solar system. STP program objectives are to:

1. Understand the fundamental physical processes of the space environment from the Sun to Earth, to other planets, and beyond to the interstellar medium.

2. Understand how human society, technological systems, and the habitability of planets are affected by solar variability and planetary magnetic fields

3. Develop the capability to predict the extreme and dynamic conditions in space in order to maximize the safety and productivity of human and robotic explorers.

These STP program objectives support the Agency's strategic goal to understand the Sun and its effects on Earth and the solar system. The Earth and Sun are linked together to form the system that has given origin and sustenance to our lives. STP missions will study the Earth and Sun system for insights into questions concerning how the system evolved so as to produce and sustain life, what will happen to this unique environment through the course of time, and how it will affect us.

These STP program objectives flow down from sub-goal 3B, "understand the Sun and its effects on Earth and the solar system," in the *2006 NASA Strategic Plan* and the *Science Plan for NASA's Science Mission Directorate (SMD) 2007-2016*. The Heliophysics roadmap, *Heliophysics: the Solar and Space Physics of a New Era*, 2009, NP-2009-08-76-MSFC, which aligns with the "*2006 NASA Strategic Plan*", is a reference document.

The *Science Plan for NASA's Science Mission Directorate (SMD) 2007-2016*, the *Heliophysics roadmap (Heliophysics: the Solar and Space Physics of a New Era, 2009,* NP-2009-08-76-MSFC) and the STP Program Commitment Agreement (PCA) provide the linkages between STP program components and the Heliophysics research objectives, and they are given in Table 1.2-1.

NASA Strategic Sub-goal 3B and Heliophysics Science Goal: Understand the Sun and its effects on Earth and the solar system.			
STP Program Components	**Applicability of Research Objectives for Heliophysics Science Goal to STP Program Components**		
	Understand the fundamental physical processes of the space environment from the Sun to Earth, to other planets, and beyond to the interstellar medium	Understand how human society, technological systems, and the habitability of planets are affected by solar variability and planetary magnetic fields	Develop the capability to predict the extreme and dynamic conditions in space in order to maximize the safety and productivity of human and robotic explorers
Science Missions			
TIMED	M	M	S
Hinode	M	S	S
STEREO	M	S	M
MMS	M	M	S

*Key: M=Major contribution; S=Supporting contribution

Table 1.2-1. Major and supporting contributions of the STP program components to achieving the research objectives for the Heliophysics science goal in the *Science Plan for NASA's Science Mission Directorate 2007-2016.*

The yearly Integrated Budget and Performance Document (IBPD) that is issued when the President's Budget Request (PBR) is released displays the Government Performance and Results Act (GPRA) performance and efficiency measures for the STP missions as well as performance measures for Heliophysics science. The performance measures for the research, making progress in achieving the Heliophysics research objectives, are independently evaluated yearly by the Heliophysics Subcommittee of the NASA Advisory Council (NAC).

Official and public documentation that the performance measures for missions is achieved, are reviewed by the NASA Heliophysics Subcommittee, collected in the NASA Performance and Accountability Report, and submitted to the Office of Management and Budget. An assessment of the efficiency measures is performed at Headquarters (HQ) and documented in the Program Assessment and Rating Tool and submitted to the Office of Management and Budget.

Agency-wide achievement of performance and efficiency measures is documented in the Performance and Accountability Report. The IBPD and PAR are available at the NASA website.

Safety and mission success requirements are found in the NASA Policy Directive (NPD) 8700.1E, NASA Policy for Safety and Mission Success, and this policy is applicable to STP and its missions.

1.3 PROGRAM ARCHITECTURE

The science and exploration objectives, the research focus areas, investigations, and achievements in the Decadal Survey and the Heliophysics Roadmap match very well along with the recommended missions and provide the basis for the NASA SMD determination of the sequence and content of additional missions in the STP Program. These additional missions are identified in the budget cycle

and expressed in an objective, quantifiable, and measurable form through updates to the STP PCA, Program Plan and individual Project Plan.

The STP Program utilizes a set of strategically defined loosely coupled missions as the major components to address strategic research focus areas containing fundamental science questions about the physics of space plasmas and the flow of mass and energy through the solar system. The loosely coupled missions in the STP Program provide an excellent match for the spatial-temporal requirements of heliophysics investigations which require understanding of the connections between processes utilizing a variety of vantages to characterize the phenomena.

The STP Program presently contains three missions in operations: TIMED (2001), Hinode/Solar-B (2006), and STEREO (2006); one mission in implementation, MMS, and two missions with STDT reports submitted (2004), Global Electrodynamics Connections (GEC) and Magnetospheric Constellation (MC). Operationally, TIMED and STEREO are operated from Johns Hopkins University/Applied Physics Laboratory (JHU/APL) and Hinode is operated from Japanese Aerospace Exploration Agency (JAXA). TIMED, Hinode/Solar-B, and STEREO have completed their prime mission and management has transitioned to the Heliophysics Scientific Research Program.

The STP missions are managed in accordance with NPD 7120.4 and NASA Procedural Requirements (NPR) 7120.5D.

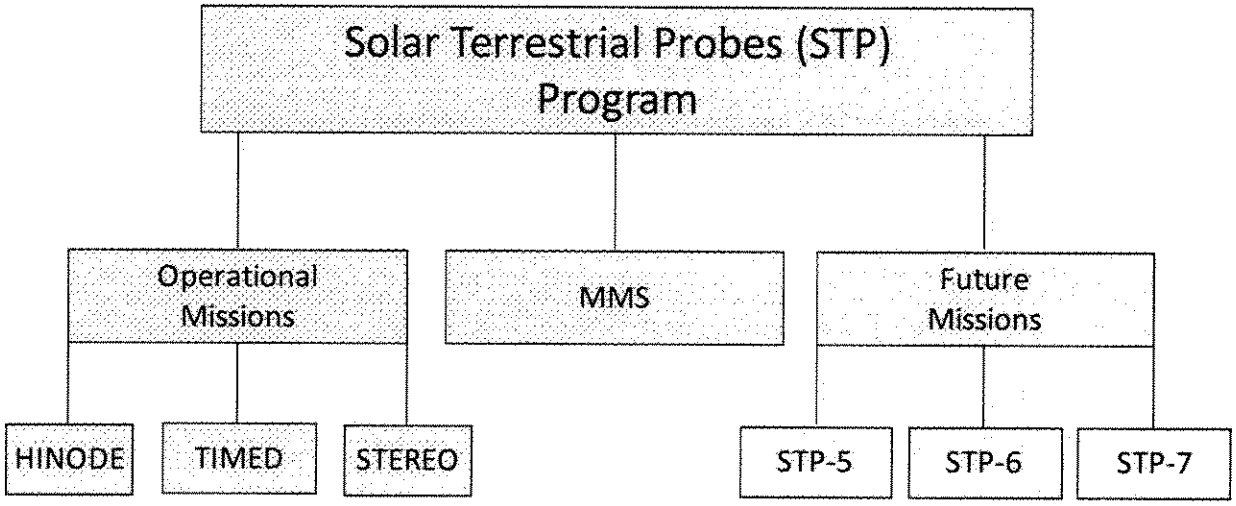

Figure 1.3. Elements of the STP program.

The STP Program relates to other organizations both inside and outside of NASA through its projects. These may include other NASA offices, other government agencies, other academic institutions, and other industrial suppliers.

The project-specific requirements appendices, i.e., Program Level Requirements Appendices (PLRA), attached to this STP Program Plan define relationships with external organizations.

1.4 STAKEHOLDER DEFINITION

The science community and NASA SMD are the immediate customers of the STP program. The NASA HQ Heliophysics Division provides the program with its operating budget, programmatic guidelines, and identification of the scientific goals and objectives. The Heliophysics science community is the principal user of the data resulting from the selected mission and provides the intellectual advice and rationale for the measurements.

Customers of the results from the STP program are: the Heliophysics science community; NASA mission operations; the national operational space weather community led by the National Oceanic and Atmospheric Administration and Department of Defense; other operational agencies of the United States (US) government; commercial, and other government agencies that operate spacecraft.

The HQ Heliophysics Division engages stakeholder communities to ensure advocacy through a variety of venues, such as, the Heliophysics Subcommittee of the NAC, the American Geophysical Union, the National Academies of Science and its Space Studies Board, and the Committee for Solar and Space Physics.

1.5 PROGRAM AUTHORITY, MANAGEMENT APPROACH, AND GOVERNANCE STRUCTURE

SMD and the STP program follow NPD 7120.4, *Program/Project Management* and NPR 7120.5D, *NASA Program and Project Management Processes and Requirements* for both program and flight project management. Projects are formulated, approved, and terminated in accordance with these procedures. SMD implements these procedures through the processes described in the NASA HQs SMD Management Handbook. If there is a conflict, the NPR is the guiding document. However, the NPR ascribes Directorate responsibilities only to the SMD Associate Administrator (AA) and does not acknowledge the SMD AA's supporting organization, which actually implements the majority of the functions assigned to the SMD AA. The SMD Management Handbook clarifies these delegated responsibilities.

The STP program is a loosely coupled program. The SMD AA has delegated flight program authority and responsibility through Division Directors (DDs) to the Program Managers at the field centers. STP program direction flows from the Heliophysics DD through a HQ Program Director to the STP Program Manager at GSFC and then to the Project Manager. The HQ Heliophysics Program Director is the Heliophysics Deputy DD. The governing Program Management Council (PMC) for the STP program is the Agency PMC.

The GSFC Center Director is responsible for establishing, developing, and maintaining the institutional capabilities (processes and procedures, human capital, facilities, and infrastructure) required for the execution of the STP program, including the system of checks and balances to ensure the technical integrity of programs and projects assigned to the Center.

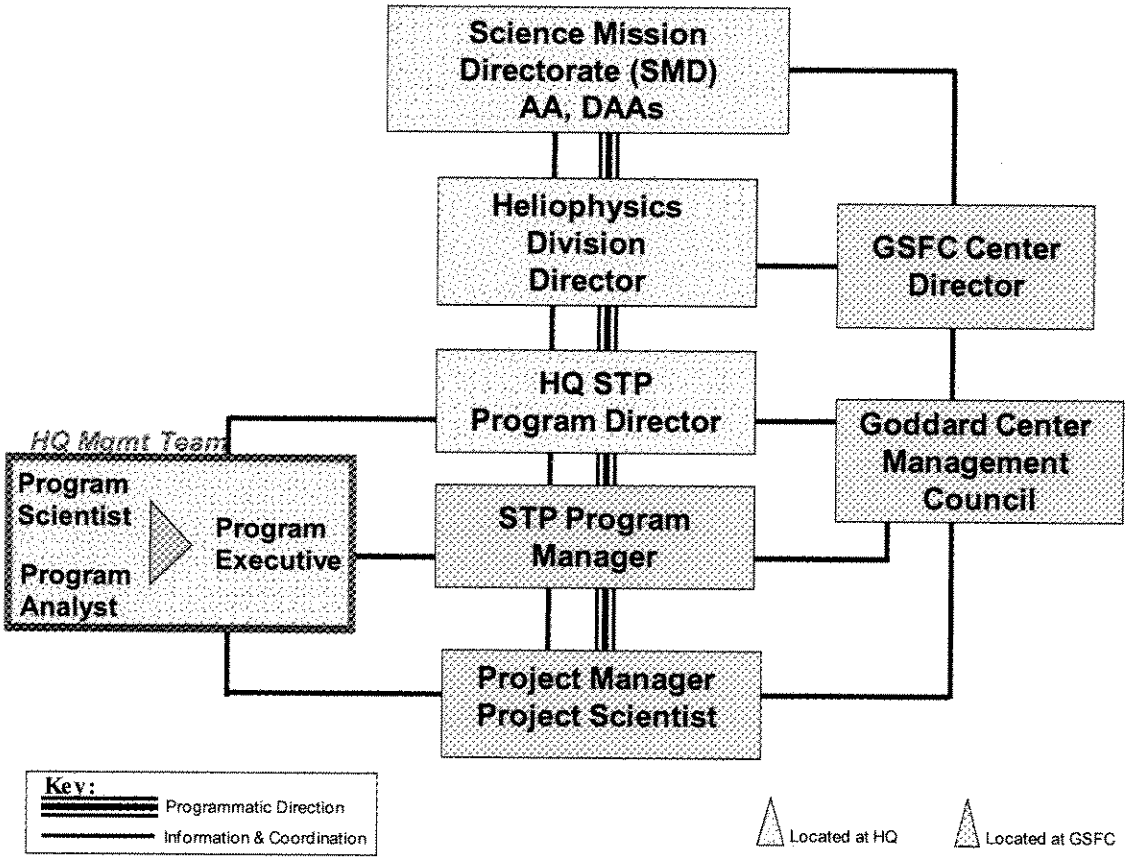

Figure 1.5-1 SMD Management Accountability

Figure 1.5-1, "SMD Management Accountability," shows the lines of authority for SMD management accountability of programs and projects. Figure 1.5-1 also shows lines of programmatic coordination.

The SMD AA delegates responsibilities to the Program Executive (PE) through the DD. The PE serves as the DD's technical arm to keep track of programmatic activities and ensure the project is initiated and executed according to approved processes. The PE acts as the primary interface for the DD with the Program and Project Managers at GSFC or other implementing organizations, maintaining a current knowledge of project status.

The STP program has a lead Program Scientist (PS), and a Program Scientist assigned to each project. The STP lead PS administers the Science segment of the STP program and, in support of the Heliophysics DD, provides a science interface and integrating function between the Heliophysics science community, the heliophysics advisory subcommittees, the international science community, and the space weather community. The Science segment is administered by awarding grants from solicited proposals for this purpose in the yearly Research Opportunities in Earth and Space Sciences (ROSES) NASA Research Announcement (NRA).

The Program Analyst (PA) retains information on each project's New Obligation Authority and budget plan, oversees the annual Planning, Programming and Budgeting Execution process, and serves as the primary point of contact to generate and maintain the IBPD for Directorate programs.

The HQ PE, PS, and PA management team maintains close contact with program and project personnel to keep abreast of project status. PEs, PSs, and PAs are not in the direct line of authority. The Heliophysics DD, Deputy DD, or the SMD AA signs letters of direction to the program and projects. When necessary, the program office may send letters of direction to the projects.

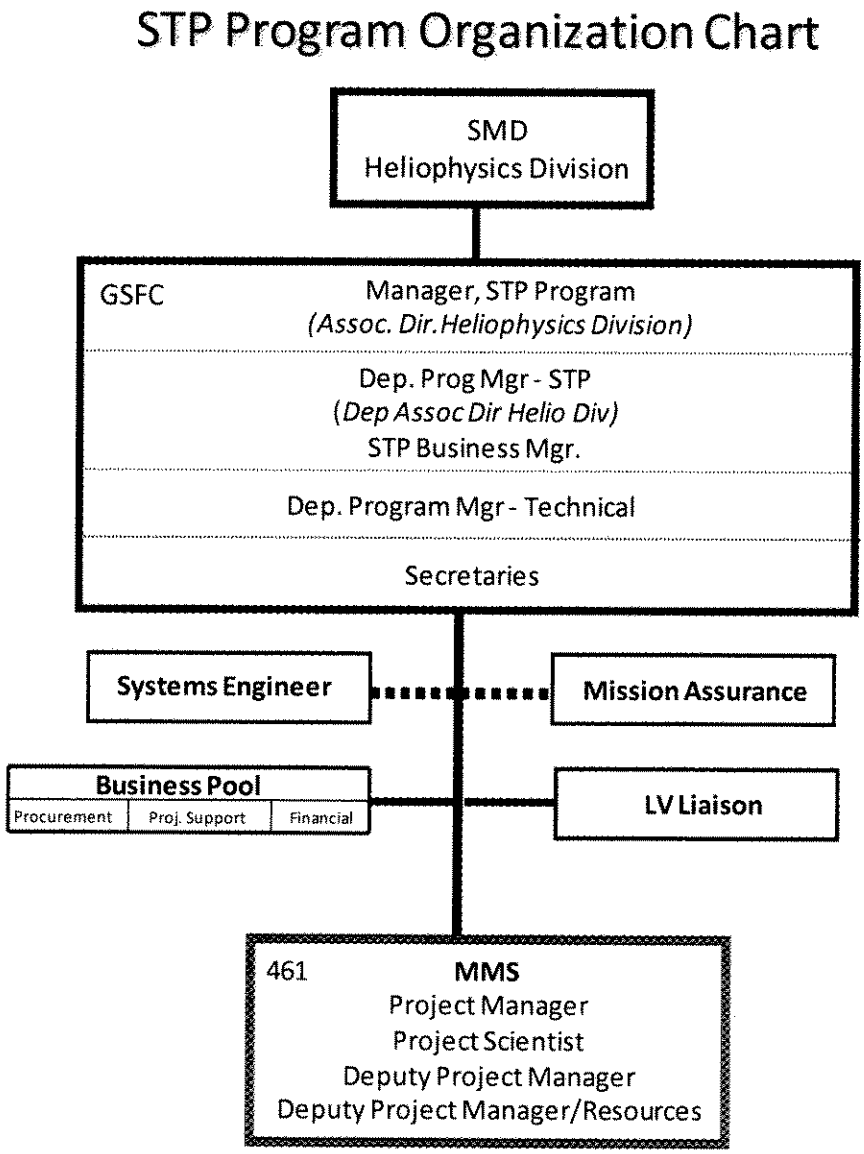

Figure 1.5-2 STP Program Organization Chart

Program-level requirements for a multi-project program such as STP are documented in the body of the Program Plan. For STP projects, the requirements are attached to the STP Program Plan as project-

specific requirements appendices, referred to as either PLRA or Level-1 Requirements. The PE generates this material through coordination with the PS, the Program Manager, the Principal Investigator (PI) (as applicable) and/or the Project Scientist (PS), the Mission Manager and Project Manager. Program-level requirements in either a Program Plan section or appendix, should be baselined under configuration control by the Heliophysics DD at the beginning of a project's Phase B and signed off by the Mission Directorate AA before Phase B ends.

The PLRA (Level-1 Requirements) shall be approved by the same signatories who approve the Program Plan, since the PLRA is an extension of that Plan. These signatories are the SMD AA, the Center Director, and the Program Manager. In addition, the Heliophysics DD, PE, PS, Project Manager, PS, and SMD Chief Engineer shall sign in concurrence. The necessary signatures and concurrences must be obtained prior to Confirmation.

Program Office - The STP program office at GSFC is the prime interface to NASA HQ and has all of the authorities, responsibilities, and accountabilities defined in NPR 7120.5D. The STP program office is the prime interface with the project office. The program office will report to the Goddard Center Management Council (CMC), Mission Directorate PMC, and Agency PMC as required.

The STP Program Manager is the senior program official in the program office at GSFC and, according to NPD 1000.0, reports to the SMD AA at NASA HQs for all program related activity. Since the SMD AA has delegated day-to-day oversight to DDs, the STP Program Manager reports to the Heliophysics DD. The Program Manager implements SMD policy and guidelines and interfaces with the Heliophysics DD, Program Director, and/or PE on program cost, schedule, and technical scope. STP Project Managers for GSFC-led projects and Mission Managers for projects not led by GSFC report to the STP Program Manager and interface routinely with PE's.

The STP Program Manager shall be responsible for the oversight of all STP missions. The program office shall develop the integrated budget requirements and recommendations for SMD, based on SMD budget guidelines that are prepared coincident with the release of the PBR and the IBPD for the upcoming FY. The program office establishes operational policies for the STP program, assures appropriate independent review of the projects in accordance with NPR 7120.5D, monitors the progress of each project, reports project and program status to GSFC and SMD management, recommends necessary corrective and preventative actions, and facilitates access to GSFC and other NASA expertise in support of the missions when requested. The technical staff will generally be matrixed to the program with little or no dedicated discipline engineering. Risk driven identification of technical areas may require deeper insight and closer tracking by the program office staff. Additional resources may be applied if necessary. The program office staff will approve movement and tracking of finances and support contract actions in accordance with HQ direction.

The Program Manager shall be responsible for tracking program metrics and reporting status to NASA HQs. Program management oversight and Technical Authority (TA) responsibilities will include regular communications with the Project Manager. Program staff will attend periodic and

lower level reviews at the implementing organization as appropriate. Program and project office Monthly Status Reviews (MSRs) will be presented to the CMC and SMD.

To support the life cycle review process, a center Chief Engineer or equivalent will be an ex-officio member of the standing review board (SRB) for NASA Space Flight Program and Project Requirements NPR 7120.5D project reviews. Staff will also attend and /or participate in selected lower level life cycle reviews. The Program Manager will approve the comprehensive project Review Plan. For NASA-led missions, GSFC shall make the initial recommendation of the SRB Chair and suggested key members for HQ approval. For non-NASA led missions, the implementing organization and GSFC shall make a combined initial recommendation of the SRB Chair and the suggested key members for HQ approval. The implementing organization leads the reviews below the SRB level with TA and program organization participation. The Project Manager will report out results and significant actions and coordinate with the SRB per the project Review Plan and in coordination with the program office and the HQ PE. The SRB will conduct its reviews and pre-brief cognizant parties.

For GSFC-led missions or those missions outside NASA, TA resides at GSFC.
The program office is responsible for recommending launch readiness to NASA HQ.

Project Office - The project office is responsible for developing and delivering the mission within cost and schedule commitments while meeting all program level requirements. Typical responsibilities include project and business management, science implementation, engineering, and safety and mission assurance (SMA). The project office has all of the authorities, responsibilities, and accountabilities defined in NPR 7120.5D to execute the mission, subject to limitations resulting from NASA's fiduciary obligations under the Federal Acquisition Regulation (FAR) and any applicable mission unique requirements or restrictions defined in the Formulation Authorization Document (FAD). Requirements flow from this STP Program Plan to the project offices. The baseline implementation approach for executing a project, including any mission specific tailoring, will be explicitly defined in the individual mission's Project Plan. The project office contingencies (reserves) for cost and schedule, technical descope options, and technical resource margins will be the responsibility of and managed by the project office. The project office will report to their organization CMC, the program office, the program office CMC, SMD PMC, and the Agency PMC as required. The project office host organization (GSFC) is responsible for signoff/commitment for launch readiness at the launch site.

1.6 IMPLEMENTATION APPROACH

The STP program office shall implement the program consistent with the latest PCA, NPR 7120.5D and HQ direction. Individual projects will be implemented per NPR 7120.5D or NPR 7120.8, as applicable. SMD approves the Program Plan which describes how the program office proposes to manage and implement the program, and holds the program manager accountable. The PLRA (program level requirements appendices) are developed and controlled by SMD and are included as an appendix to the Program Plan. STP projects shall use the PLRA to generate lower level requirements for implementation. NASA HQ uses these requirements to evaluate the project's performance during implementation.

Individual mission implementation is defined by each project in the Project Plan and approved by the program office and SMD. Major project element make-or-buy and trade studies are conducted at the project level to support an SMD decision. Each project develops its acquisition strategy in accordance with NASA and Center Procurement Processes to ensure cost, schedule, technical, and risk performance with appropriate insight/oversight and the use of appropriate contractual vehicles including Cost Plus Incentive Fee, Cost Plus Award Fee, etc. Partners contributing elements to a project are project-unique and their provisions are controlled by project or NASA HQ Agreements (in the case of international partnerships).

2.0 PROGRAM BASELINE

2.1 REQUIREMENTS BASELINE

2.1.1 Program Requirements

a. The STP program shall implement missions selected by NASA HQ/SMD that are defined using advice from the strategic planning and roadmap processes. Through the annual budgeting process, NASA HQ/SMD will attempt to provide a continuous line of funding for each mission that it selects.

b. The scope and technical performance for each project shall be defined by HQ/SMD before project formulation commences.

c. A FAD issued by HQ/SMD for each selected project shall constitute the authorization to begin formulation with approval from the SMD PMC at KDP-A.

d. The Announcement of Opportunity (AO) process shall be used to procure the science investigations required to meet the mission objectives as documented in the FAD. The Program Level Requirements Appendices (PLRA) shall be consistent with the AO.

e. The Mission Requirements Document shall show a direct correlation in their derivation from the PLRA.

f. Launch vehicles used for STP missions shall be SOMD approved vehicles consistent with the payload class defined in NPR 8705.4, Risk Classification for NASA Payloads.

g. International partnerships for space flight hardware and software shall be conducted under formal agreements with no exchange of funds.

h. Each science investigation team shall adhere to the SMD Heliophysics Division data policy, as described in *NASA Heliophysics Science Data Management Policy* (dated June 25, 2007).

i. Each science investigation team shall perform the analyses required to achieve the science goals of the mission, as defined in the PLRA and publish the scientific results in the peer reviewed literature.

2.1.2 Requirements Documentation

STP program requirements for specific STP projects are documented in the PLRA to this Program Plan.

2.1.3 Program Requirements on Projects

a. PLRA to the STP Program Plan shall be signed by the approving authorities during Phase B, prior to the Confirmation Review (CR). The core of the Approval subprocess within SMD is called Confirmation, a term used by SMD to reflect SMD's approval to go forward. For projects where the SMD PMC is governing, the CR is the gate for the Key Decision Point (KDP)-C approval. For programs and Category-1 projects, (and selected Category-2 projects) the CR is followed by an Agency PMC meeting, which becomes the KDP-C gate. The governing PMC shall always conduct the KDP meeting.

b. Compliance verification and traceability of the requirements that flow down from the program to the projects shall be conducted as part of the KDP reviews.

c. Requirements and changes to program-level requirements shall require approval of the Program Manager, SMD AA, and the GSFC Center Director and the concurrence of the Heliophysics DD.

d. Missions shall have no proprietary data analysis periods, but shall release mission data as soon as possible after a brief validation period.

e. A requirements traceability and verification matrix as defined in the SMA Plan shall be used to confirm that the mission system has met all requirements and is ready for launch.

f. Project Scientist appointments shall be approved by SMD. The SMD AA has delegated that authority to the SMD DDs.

g. The SMD AA exercises the NPR 7120.5D option for directorate approval of STP Project Plans and delegates this responsibility to the Director of the Heliophysics Division. Therefore, the Heliophysics DD shall review and concur on all Project Plans.

2.1.4 Mission Classification and Life-Cycle Costs (LCCs)

Table 2.1.4-1 below defines the STP Mission Categorization, the governing PMC and the Risk Classification. The program level requirements including cost limits and launch dates for the missions are set forth by SMD in the Program Plan Appendices (Level-1 Requirements). Table 2.1.4-2 shows key milestones and life cycle cost (LCC) for existing missions as identified in the 2010 PBR.

Program or Project/TA	Category	Governing PMC	Risk Classification
MMS/GSFC	1	Agency	C

Table 2.1.4-1: Program/Project Categorization, Governing PMC, Risk Classification

Table 2.1.4-2 defines the key dates and time frames for the phase transitions for each project based upon the latest STP program master schedule dated December 2009. Dates and costs for projects in formulation are guidelines for planning purposes and are subject to change as the STP program matures.

Project	Start Formulation	Mission Design Review (MDR)/ Preliminary Non-Advocate Review (NAR)	Start Implementation	Ready for Launch	Start Prime Operations	End Prime Operations	Life Cycle Cost for Prime Mission ($M)
Projects in Implementation							
MMS	5/2002	9/2007	7/2009	8/2014	12/2014	12/2016	1,003

Table 2.1.4-2. Key dates or target dates and time frames for the phase transitions for each project based upon the latest STP program master schedule dated December 2009. This table will not be maintained in this document.

LCC constraints for STP projects are identified in appendices. The agency budget database (N2) identifies budget constraints, by FY, for the STP program and each project, as described in Section 2.4. Constraints are validated during the yearly budget cycle and as required throughout the FY. See Section 2.4, Table 2.4-1, for yearly budget constraints for projects in the implementation phase and yearly estimates for all other STP program/project elements.

2.2 WBS BASELINE

The STP program Work Breakdown Structure (WBS) is depicted in Figure 2-2. As a loosely coupled program, each major program element or project is funded by a unique project structure number. The STP program management and future missions element is depicted at level 2 and is executed by the STP program office. All other elements or projects are shown at level 1 only, as the detailed WBS and WBS dictionaries are developed and controlled at the project level.

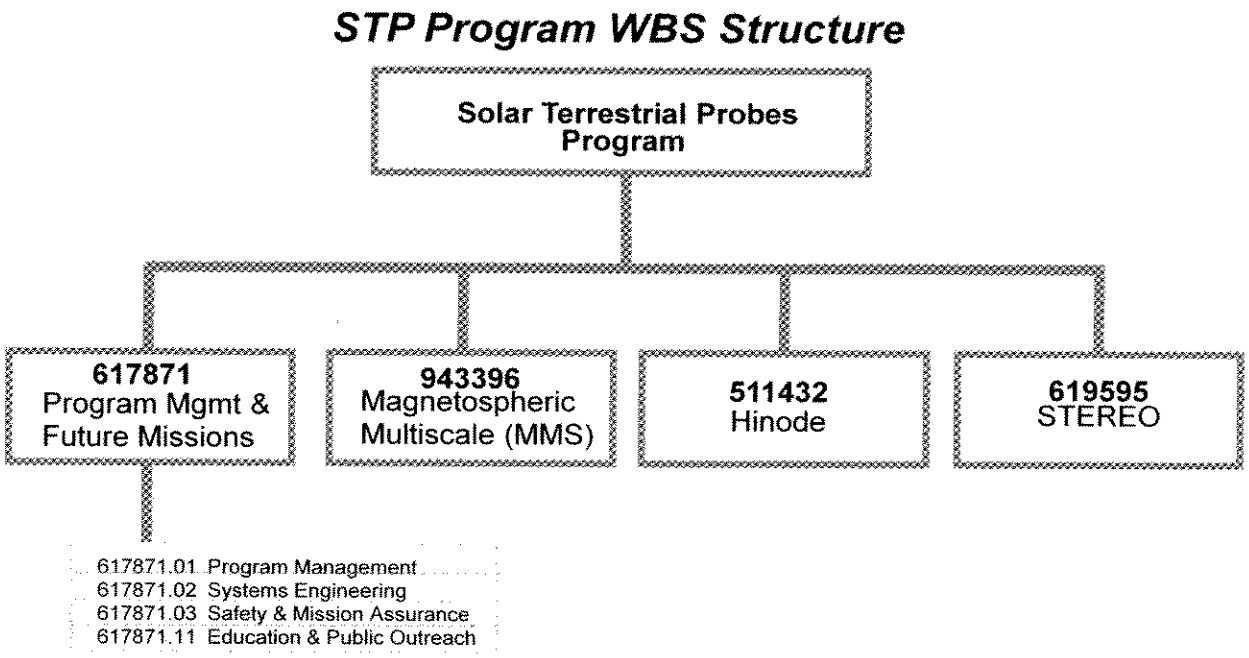

Figure 2-2: STP Program WBS

The level 2 WBS dictionary for the STP Program Management and Future Missions element is shown below. Project WBS's are established and maintained by the project office.

617871 STP Program Management and Future Missions

617871.01 Program Management: The business and administrative planning, organizing, directing, coordinating, analyzing, controlling, and approving processes used to accomplish overall program objectives, program level reviews, and reports to the Center and Agency management. The effort includes STP program management, program office general support, configuration management (CM), scheduling, information technology (IT) services, housing cost, center assessments, and independent review funding for the STP program and its projects.

617871.02 System Engineering: The technical and management efforts of directing and controlling an integrated engineering effort for the program as well as TA. This element includes efforts for defining technical objectives, conducting trade studies, and overseeing mission engineering. Integrated planning and control of technical program efforts of design engineering, software engineering, specialty engineering, system architecture development and integrated test planning, system requirements writing, configuration control, and technical. This includes risk management to assure monitoring of the technical program and accomplishment of STP Program goals. Includes labor, procurements and other direct cost.

617871.03 Safety and Mission Assurance: The technical and management efforts of directing and controlling the SMA elements of the program as well as TA. This element includes design, development, review, and verification of practices and procedures and mission success criteria intended to assure projects meet performance requirements and function for their intended lifetimes. Includes labor, procurements, and other direct costs.

617871.11 Education & Public Outreach: The technical and management efforts of providing the education and public outreach (EPO) responsibilities of the program as directed by HQ/SMD/Heliophysics Division. Includes management and coordinated activities, formal education, informal education, public outreach, and media support. Includes labor, travel, procurements, and other direct cost. STP program level EPO funding was eliminated after FY2008.

2.3 SCHEDULE BASELINE

As a loosely coupled program, the STP master schedule provides a summary of major project milestones only; the mission order is specified by SMD and driven primarily by the availability of funds. Individual project schedules are integrated and controlled by the respective projects in accordance with the project schedule management plan, as flowed down through the STP program schedule management plan. The STP program master schedule, as of December 2009, is depicted in Figure 2-3.

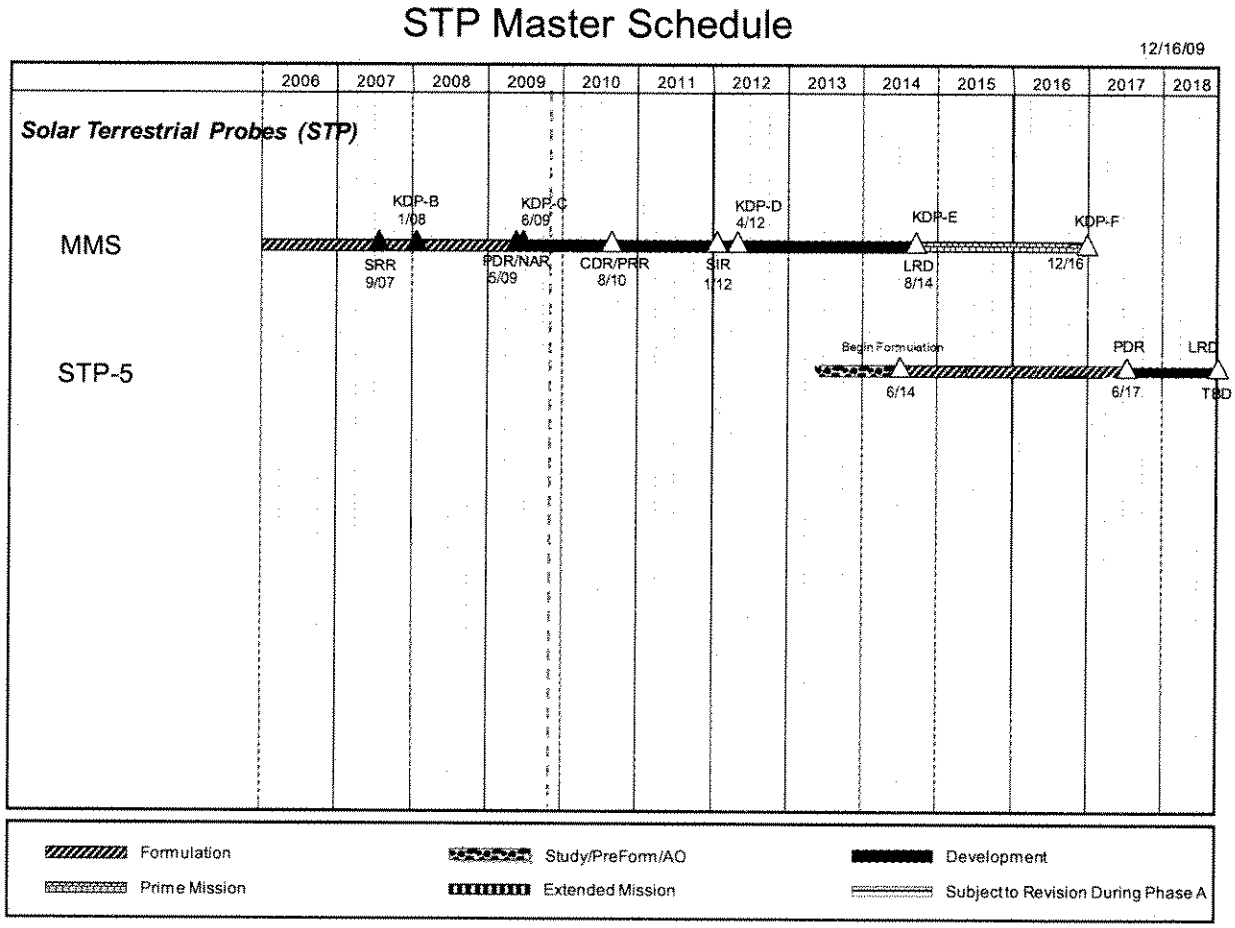

Figure 2.3: STP Program Master Schedule as of December 2009. This chart will not be maintained in this document.

2.4 RESOURCE BASELINE

Table 2.4-1 identifies the current STP program resource (or workforce) baseline that coincides with Figure 2.3. Table 2.4-2 identifies the current STP program yearly workforce requirements associated with FY10 PBR. These workforce requirements were generated in April 2009; STP program office requirements are based on the shared infrastructure approach identified below.

The STP program utilizes a shared infrastructure to accomplish program level requirements. The Explorers and Heliophysics Projects Division at Goddard Space Flight Center (GSFC) encompasses the Living with a Star, STP, and Explorers programs. Staff, IT infrastructure, and other routine resources are shared across the programs to any extent possible, in order to maintain efficiency and consistency across the Division. Other than routine office space, there are no facilities requirements at the program level. Infrastructure requirements for STP projects, including acquisition, renovations, property/facilities, personal property, and IT resources are identified in the individual project plans.

**SOLAR TERRESTRIAL PROBES (STP) PROGRAM BUDGET
BY PROJECT/ELEMENT, FY10 PRESIDENT'S BUDGET
($ in millions)**

	PY	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	Budget to Complete	Total
Total Solar Terrestrial Probes	**$66.9**	**$71.9**	**$123.2**	**$143.0**	**$169.1**	**$170.6**	**$160.8**	**$164.3**	**$90.5**	**$1,160.2**
Hinode (511432)		9.1	13.2	12.4	8.0	8.0	8.0	8.2	0.0	**66.9**
Solar Terrestrial Relations Observatory (619595)		18.0	12.4	10.7	10.0	10.0	10.0	10.2	0.0	**81.3**
Magnetospheric Multiscale (MMS) (943396)	66.9	43.1	94.6	118.6	149.3	148.8	137.5	143.8	90.5	**993.0**
STP Program Mgmt & Future Missions (617871)		1.7	3.0	1.3	1.8	3.8	5.3	2.1	0.0	**19.0**

Table 2.4-1: STP Program/Projects Funding. This chart will not be maintained.

**SOLAR TERRESTRIAL PROBES PROGRAM
CIVIL SERVANT (FTEs) and CONTRACTOR (WYEs) WORK FORCE
FY10 President's Budget**

		FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014
Total Solar Terrestrial Probes	**FTEs**	**104**	**125**	**134**	**139**	**144**	**124**	**104**
	WYEs	**69**	**70**	**70**	**70**	**68**	**63**	**42**
	Total	**173**	**195**	**204**	**209**	**212**	**187**	**146**
Hinode (511432)	FTEs	6	3	3	3	3	2	0
	WYEs	3	1	1	1	1	0	0
	Total	9	4	4	4	4	2	0
Solar Terrestrial Relations Observatory (619595)	FTEs	5	5	4	5	5	5	5
	WYEs	6	5	2	2	2	2	2
	Total	11	10	6	7	7	7	7
Magnetospheric Multiscale (MMS) (943396)	FTEs	90	115	125	130	134	116	97
	WYEs	56	63	66	66	64	60	39
	Total	146	178	191	196	198	176	136
STP Program Mgmt & Future Missions (617871)	FTEs	3	2	2	1	2	1	2
	WYEs	4	1	1	1	1	1	1
	Total	7	3	3	2	3	2	3

Table 2.4-2: STP Program/Project Office Work Force. This chart will not be maintained.

3.0 PROGRAM CONTROL PLANS

3.1 TECHNICAL, SCHEDULE, AND COST CONTROL PLAN

Monthly technical, schedule, and cost information is collected, analyzed, acted upon, and reported to GSFC's CMC, SMD, and agency Budget and Performance Report to assure that all project and program requirements are being met with adequate reserves. The STP Program and/or Project Manager and their team shall conduct Project Reviews, Failure Review Boards, Configuration Control Boards (CCBs), and schedule and cost reviews. Risk management shall be applied following the guidelines of Goddard Procedural Requirement (GPR) 7120.4A, Risk Management Procedural Requirements. The minimum set of Risk Management tools that shall be used are schedule, technical, and financial reserves, risk mitigation starting early in the program, Probabilistic Risk Assessment, Failure Modes and Effects Analysis, Fault Tree Analysis, engineering models, and use of descope options.

Technical status for each mission shall be tracked via requirements shown in the Level 1 through Level 4 Requirements Traceability and Test Verification matrices. Tracking shall follow processes and requirements specified in the project SMA Requirements document as well as the project's Systems Engineering Management Plan and Risk Management Plan. Design margins shall be established and the reserves tracked and reported.

Schedule management for the STP program and projects will be implemented in accordance with the STP Schedule Management Plan (461-PLAN-0002). Integrated master schedules shall be generated for all projects of the STP program using automated scheduling tools and appropriate schedule management methodology that shows both baseline and current schedule data. They shall identify the project critical path for management and control and ensure that schedules contain all critical milestones for internal and external activities, time durations for activities, schedule reserves or slack, and interdependencies.

Cost control shall incorporate monthly tracking metrics such as reserve status, liens and encumbrances, reserve percentage of cost to go, obligations and cost – plan vs. actual forecast, and labor – plan vs. actual forecast. The project shall be responsible for implementing a system that meets NASA requirements as stated in NPR 7120.5D for a cost, schedule and milestone tracking system that provides sufficiently detailed data to adequately and quantitatively assess the current progress of the mission on a monthly basis, and provide a forecast for accomplishing work to be completed within the remaining established cost and schedule parameters. Schedule and cost status shall be provided as part of the monthly project review process.

Earned Value Management is not implemented at the program level. Each project shall implement an Earned Value Management process in accordance with current NASA policies, NPR 7120.5D requirements, and consistent with their center/organization best practices to control costs. Costs and schedules shall be tracked against baseline

projections and shall be reviewed monthly to ensure that performance is closely monitored and appropriate actions taken if necessary.

3.2 SAFETY AND MISSION ASSURANCE (SMA) PLAN

The STP program office shall be responsible for ensuring that STP projects develop approved SMA plans and implement those plans. The SMA Standards of the project host organization shall be used when the project office resides in that organization. In addition, the project office shall address the SMA requirements of the NASA procurement vehicle (e.g., AO, etc.) and obtain concurrence with the STP program office for any waivers to these requirements.

Project requirements flow from the NASA and GSFC SMA requirements and may be tailored and/or expanded for the specific mission. Each project shall develop SMA plans that meet current requirements and reflect a project life-cycle process perspective, addressing areas including: procurement, management, design & engineering, design verification & test, software design, software verification & test, manufacturing, manufacturing verification & test, operations, and pre-flight verification & test.

For GSFC-managed projects, the program will utilize the existing Nonconformance Report (NCS)/Corrective Action System database and the Problem Report/Problem Failure Report database for the Closed Loop Problem Reporting and Resolution System. Projects that are not hosted at GSFC will utilize their existing problem reporting system which will feed into the GSFC system.

3.3 RISK MANAGEMENT PLAN

STP has established a Program Level Risk Management Plan (461-PLAN-0001). The program's risk management approach is described in the Risk Management Plan in accordance with the requirements of NPR 7120.5D and NPR 8000.4 Risk Management Procedural Requirements. The plan governs how technical, cost, schedule, and other forms of risk will be identified, analyzed, tracked, controlled, communicated, and documented to increase the likelihood of achieving program/project goals. The goal of risk management on the STP program is to identify risks and mitigations necessary to avoid occurrence or realization of the risks. Program level risk board meetings are conducted on an as needed basis. The Program Manager or Deputy chairs the risk board meetings. The Risk Board evaluates the risks for the cost, schedule, performance, and probability of occurrence and effectiveness of the mitigation. The program office reviews each project's significant risks monthly. These risks are then presented at the MSR conducted by the GSFC CMC.

The STP program office manages program level risks that affect more than one project via the STP program risk board as described in the STP Risk Management Plan. In accordance with these requirements, every STP project will establish a Risk Management Plan that identifies the cost, schedule, and technical risks within the project and methods

to accommodate or mitigate them. Details of the project's risk management approach will be described in its Risk Management Plan in accordance with the requirements of NPR 7120.5D, NPR 8000.4 Risk Management Procedural Requirements, and the STP Program Risk Management Plan.

The program office assists the projects in concluding intra-agency and international agreements with SMD.

3.4 ACQUISITION PLAN

There are no major acquisitions at the program level. The program office supports HQ in the identification of new missions and the conduct of the Acquisitions Strategy Meeting (ASM). All major acquisitions are performed at the project level. Each project's acquisition strategy and processes shall be fully described in its STP Project Plan in accordance with NPR 7120.5D. Science investigations will be provided by SMD-selected PI's through AO's or an international or interagency partner under an approved agreement. In the acquisition of scientific instruments, spacecraft, and science investigations (including Research and Analysis), NASA will use full and open competitions to the greatest extent possible. Certain instruments, missions, or mission systems may be acquired without competition (e.g., through international partnerships or in-house builds) provided that there is a clear scientific, technological, or programmatic benefit to NASA to do so. Such arrangements shall be approved by the AA for SMD. The project manages the implementation of these investigations. Spacecraft may be provided through industry, in-house by a NASA Field Center, or an international partner under an approved agreement. SMD retains make-or-buy decision authority for all spacecraft. Launch vehicles will be acquired through existing contracts managed by the Space Operations Mission Directorate (SOMD) except when provided by an international partner or another organization under an approved agreement or when the STP mission is not a primary payload on the launch vehicle. In the latter case, arrangements for access to space will be made on a case-by-case basis and documented using agreements. Acquisitions for operations services shall be consistent with NASA policy. The project will utilize established host organization processes and procedures in accordance with NPR 7120.5D.

For GSFC managed projects, the Project Acquisition Plan is developed by the Project Manager, supported by the GSFC Office of Procurement and shall be consistent with the results of the Acquisition Strategy Planning meeting and the ASM. It documents an integrated acquisition strategy that enables the project to meet its mission objectives, provides the best value to NASA, and complies with the FAR and the NASA FAR Supplement. The Acquisition Plan addresses all the required topics listed in FAR Part 1807.105 and 1807.106 and NFS Part 1807.105.

Projects shall describe completed or planned studies supporting project level make-or-buy decisions, considering NASA's in-house capabilities and the maintenance of NASA's core competencies, as well as cost and best overall value to NASA. For each science mission, the Heliophysics DD may charter a STDT before the start of formulation

to provide advice including prioritized science requirements and to identify a pre-concept that satisfies the science requirements constraints and technology development requirements for the project. These requirements may form the basis for an AO for the acquisition of scientific investigations that include science instruments.

There are no program level agreements in place. Projects will describe all agreements, memoranda of understanding, barters, in-kind contributions, and other arrangements for collaborative and/or cooperative relationships in the Project Plans. Partnerships created through mechanisms other than those prescribed in the FAR will be identified in the Level I requirements for each project. All such agreements (the configuration control numbers and the date signed, or projected dates of approval) necessary for project success will be listed. In addition, all agreements concluded with the concurrence of the Program Manager will be included and referenced.

Contractor incentives for strengthening SMA and risk-based acquisition management are addressed in individual Project Plans.

When external (non- STP) agreements are needed and made, their documentation is part of the project-specific requirements appendix to the STP Program Plan.

3.5 TECHNOLOGY DEVELOPMENT PLAN

The SMD has decided to include all technology development within project lines instead of having separate technology development plans and programs. Accordingly, each project shall provide a Technology Development Plan as required that includes the content tailored for the project as specified in Appendix E, paragraph 3.5 in NPR 7120.5D.

3.6 SYSTEMS ENGINEERING MANAGEMENT PLAN (SEMP)

STP is a loosely coupled program and, therefore, each project within STP shall have a project System Engineering Management Plan (SEMP). The STP Program Systems Engineer ensures that the project SEMP's meet the requirements defined in NPR 7123.1A.

The test, validation, and verification requirements for hardware and software are mission unique and shall be addressed separately in the SEMP and/or Project Plan for each project. The individual plans shall also address software independent verification and validation.

The STP Program Systems Engineer shall monitor the technical progress of all STP projects and shall conduct periodic meetings with all of the Project Systems Engineers to facilitate and encourage dialogue and knowledge sharing across the projects. He or she identifies or conducts trades studies for areas that span multiple projects to encourage risk or cost reduction for the program.

3.7 REVIEW PLAN

3.7.1 Program Reviews

The STP program office shall support reviews consistent with NPR 7120.5D. A program level Status Review and Program Implementation Review will be conducted biennially by a SRB. This review will consider all aspects of the STP program and the flow down to individual projects. The STP program office will support monthly reviews with the GSFC CMC at the GSFC MSR that assess technical, schedule, and financial performance for each project and the program.

3.7.2 Program Review of Projects

The STP program shall conduct reviews on a periodic and as-required basis to assess project progress, evaluate risk, ensure compliance, and address issues. These reviews may include, but are not limited to, Monthly Project Reviews, Independent Reviews, and weekly informal tag-ups. Monthly Project Reviews shall assess technical, schedule, and cost status, and shall include accomplishments, issues, risks, resources status (e.g., mass, power, schedule reserve, cost reserve), schedule changes, and cost variance analysis.

The project shall baseline a review plan that supports the formulation and implementation of each mission or project. Additionally, the review plan shall identify peer reviews and other reviews in accordance with host Center standards and practices, program review requirements, and the requirements in NPR 7123.1A, *NASA Systems Engineering Processes and Requirements*.

3.7.3 Review Processes for the Project Office(s)

The project office shall ensure that the review process, as specified in the Review Plan and applicable project host organization directives, is followed and supported. GPR 8700.4F, Integrated Independent Reviews, defines the purpose of each review. The following sets of reviews shall be included in the project's Review Plan:

1. Project gate reviews leading to each KDP, as defined by NPR 7120.5D, shall be conducted by the SRB and defined in the Project Plan.

   These formal reviews will be convened by the applicable technical and programmatic authorities. The SRB will report out to the project office, STP program office, the GSFC CMC, and the SMD and Agency PMC's consistent with the mission project classification per NPR 7120.5D.

2. Engineering Peer Reviews - A comprehensive set of engineering peer reviews will be established by the organization that is the provider of the engineering product. Participants will be selected by the project office host organization and are independent of the development activity under review. Every effort will be made to

include technical experts from, or recommended by, GSFC. The results of the review will be reported to the STP program office.

3. Anomaly Reviews - Review Boards for anomalies that have an unknown cause and represent significant programmatic or technical risk, shall be held and will be independent of the project and established by the project office host organization's SMA Office and Chief Engineer with applicable membership from the STP program office's supporting TA.

4. Management Reviews - The project office host organization shall conduct regular status reviews and provide reports to the SMD Weekly Reporting System (as required by SMD), monthly and/or quarterly status reviews. The project office will provide/present an overall project assessment in the key areas of technical, schedule, cost and management including significant progress; concerns/issues (including resolution plans/expected outcomes); contingency/reserves and liens status; and all significant risk threats to the implementation or mission success. The STP program office shall have a standing seat in the project office host organization's monthly senior status review process. A summary of the project's status shall be provided to the STP program office in support of the program's monthly review process. The project office will present to the GSFC CMC on a monthly basis.

5. Assessment Reviews – The project office host organization will convene, when necessary, assessment reviews to evaluate the readiness of the project to execute a mission critical event, e.g., launch, encounter, etc., or to assess the design risk of a pending implementation. Representatives of the STP program office and HQ can also participate in these reviews.

3.7.4 Termination and Cancellation Review Criteria

Mission Termination

Within SMD, mission termination refers to the decommissioning of a mission. It is the process for ending a project that has conducted part of or its entire prime mission and which may have completed one or more extended missions. This is different than mission cancellation which refers to ending project activity before the mission is launched.

There are two means within SMD that can lead to mission termination:

- The first is through a programmatic path, such as the outcome of a Senior Review or a significant budget reduction.

- The second is as a result of a condition on the spacecraft, which may be an unexpected on-orbit anomaly, or the exhausting of consumable resources.

Mission Cancellation

During Implementation, each project will develop the mission within the established performance, schedule, and cost requirements identified in the PLRA (Level 1 document)

If at any time during development the Program Manager or the PE believes that the project is unable to achieve the PLRA (Level 1) requirements, or that the project development cost is anticipated to exceed the baseline by either the Congressional 15 percent or 30 percent limit, or the schedule has slipped by more than 6 months, they must notify the DD, who initiates a management notification process.

A Cancellation Review is not required if the SMD AA agrees to change the requirements or if the project is able to demonstrate that cost growth is above and beyond their control or if they can descope the mission concept or design in order to stay within the technical, cost, and schedule constraints. If none of these occurs, then it is appropriate to recommend a Cancellation Review.

If SMD decides a Cancellation Review is in order, the governing PMC, the NASA AA, and the NASA Chief Engineer must be notified before the Center is contacted.

If a Cancellation Review is required, the program and the project teams present status and any material requested by the Decision Authority. A Center assessment is presented as the TA at the program or project level. An independent assessment review will be commissioned by the Decision Authority and following its completion, the governing PMC will hold the Cancellation Review.

3.8 MISSION OPERATIONS PLAN

There is no STP Mission Operations Plan since the program is a set of fairly loosely coupled missions each of which have dedicated missions operations plans. The STP projects shall prepare Missions Operations Plans utilizing established host center/Institutional processes and procedures in accordance with NPR 7120.5D. The Mission Operations Plans will be reviewed at the Mission Critical Design Review. It will be baselined in Phase D and reviewed at the Missions Operations Review.

3.9 ENVIRONMENTAL MANAGEMENT PLAN

The STP program and projects shall comply with NPR 8580.1, *Implementing the National Environmental Policy Act and Executive Order 12114*. There is no program specific Environmental Management Plan as the requirement is flowed to the STP project offices. Each STP project office shall prepare an Environmental Management Plan utilizing GPD-*8715.1B GODDARD SPACE FLIGHT CENTER SAFETY POLICY, GPR-1700.1- OCCUPATIONAL SAFETY PROGRAM AT GSFC* and other applicable Center documents or equivalent Institutional requirements at JHU/APL.

The STP program office shall support the project offices in the development of this plan. Products and processes having environmental issues shall be identified at the earliest possible time during formulation to ensure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts. Project Environmental Data Management Plans shall be submitted to the STP program office for approval.

3.10 LOGISTICS PLAN

The logistics requirements are identified by each project in their individual Project Plans. There is no program level Logistics Plan. The STP project offices shall each prepare logistics plans utilizing established Center/Institutional processes and procedures in accordance with the Project Plan requirements in NPR 7120.5D and NPD 7500.1B Program and Project Logistics Policy.

3.11 SCIENCE DATA MANAGEMENT PLAN

There is no STP program level Science Data Management Plan as the requirement is flowed down to the STP projects. STP project offices shall develop a draft project Data Management Plan by Preliminary Design Review in accordance with *NASA Heliophysics Science Data Management Policy* (dated June 25, 2007) to address the total activity associated with the flow of science data, from acquisition, through processing, data product generation and validation, to archiving and preservation. The data management plan shall be formally approved no later than the project office's Critical Design Review. Science analysis software development, utilization, and ownership shall be covered in the Data Management Plan.

It is NASA policy that all data taken by NASA's space flight mission programs shall be publicly archived as soon as they can be properly validated and calibrated. NASA's science AOs require that this activity be budgeted in proposals. All data collected through the STP program are to be placed in the public domain at the earliest possible time following their validation and calibration. Exceptions are on a mission-by-mission basis. Data preparation shall be accomplished within a few months from the time that NASA delivers the data to the investigation team. One exception is data that may be released almost immediately for public relations purposes.

The STP program adherence to all NASA sample handling, curation and planetary protection directives and rules, including NPR 8020.12C, *Planetary Protection Provisions for Robotic Extraterrestrial Missions,* is not required as there are no STP missions currently envisioned requiring planetary protection.

3.12 INFORMATION AND CONFIGURATION MANAGEMENT (CM) PLAN

The STP program has a stand-alone CM, 461-PG-1410.2.1C, STP Configuration Management Procedure. This procedure defines the CM requirements for the STP program and projects to meet the requirements of NPR 7123.1A and GSFC GPR 1410.2C, Configuration Management.

The STP CM system uses CCBs at both the program and project levels. This allows for CM to be handled at the most appropriate level within the organization. For each organization level, types of configured items have been assigned for CM. The STP program CCB is chaired by the STP Program Manager or designee, who has overall responsibility for all STP program and project office activities.

The STP CM Procedure describes the structure of the CM organization and tools used. It describes the methods and procedures to be used for configuration identification, configuration control, interface management, configuration traceability, and configuration status accounting and communications. It also describes how CM will be audited.

The CM procedure addresses CM requirements for document configuration control only. Configuration Control for products is not required at the program office level but shall be addressed as necessary in project office CM procedures.
The STP CM procedure does not apply to STP directives posted in the Goddard Directives Management System. These directives are controlled using the procedures described in GPR 1410.1.

The STP program shall follow the information management and knowledge capture requirements in NPD 2200.1, *Management of NASA Scientific and Technical Information*, NPR 2200.2B, *Requirements for Documentation, Approval, and Dissemination of NASA Scientific and Technical Information,* NPD 1440.6, *NASA Records Management,* and NPR 1441.1, *Records Retention Schedules.*

The STP project or mission manager shall be responsible for determining lessons learned and entering them into the NASA database after launch in accordance with NPR 7120.6 (Lessons Learned Process).

3.13 SECURITY PLAN

3.13.1 Security Requirements

The STP program methodology for ensuring security and technology protection will utilize established procedures in the GPR documents with the assistance of the GSFC Facilities Division and GSFC Security Division. GSFC maintains Building Emergency plans (700-SFTY-0001). The programs approach to implementing IT security requirements shall be accordance with GPR 2810.1. The content of these plans addresses the Emergency Notification System, Types of Emergency Situations, Occupant Response Procedures, and Incident Management Responsibilities. The program office identifies an individual who works with the Facilities Operations Managers (FOMs) to maintain and communicate building emergency plans.

3.13.2 Information Technology (IT) Security Requirements

Projects hosted at other centers or organizations will use their own institutional requirements and applicable NASA NPRs (NPR 2810.1, etc.).
The STP program IT system is covered under the Agency System Security Plan OA-700-M-NSS-1002 - ODIN Desktop Services. This IT security plan covers all of the areas specified in National Institute of Standards and Technology (NIST) 800-53, "Recommended Security Controls for Federal Information Systems ", and Federal Information Processing Standards (FIPS) 199 "Standards for Security Categorization of Federal Information and Information Systems".

The IT plan covers access, control and authentication; training; auditing; certification, accreditation and assessment; CM, contingency planning; incident response; maintenance; media protection; physical and environmental protection; personnel security; risk assessment; system and services acquisition; system and communication protection; and system and information integrity.

3.13.3 Emergency Response Requirements for Facilities

STP complies with NASA Continuity of Operations Planning and Procedural Requirements (NPR 1040.1) and Emergency Preparedness Plan for Greenbelt (GPR 8710.2A). The program office identifies an individual (nominally the Program Support Manager) who works with the FOM to maintain and communicate building emergency plans.

3.14 EXPORT CONTROL PLAN

Each project shall prepare and implement an Export Control Plan, as required. There will be no STP program level Export Control Plan as the deliverables subject to Export Control are provided at the project office Level. Individual STP project office Export Control Plans will be prepared and implemented at the project office level working with the GSFC Export Control Office. STP project offices will comply with the export control requirements specified in NPR 2190.1, *NASA Export Control Program.*

3.15 EDUCATION AND PUBLIC OUTREACH (EPO) PLAN

The STP program EPO activities will be conducted at the direction of HQ/SMD/Heliophysics Division, either by the Heliophysics DD or through targeted announcements through the ROSES NRA and/or at the investigation level EPO funding awarded to the investigations through the AO. The projects shall prepare EPO Plans that include investigation level plans submitted in response to the AO by the selected investigators. Project level EPO plans will meet requirements identified by HQ/SMD and may include effort and activities to improve science literacy by engaging the public in understanding the program, its objectives, and benefits. The plans may also include development of educational activities, services, and products that contribute to our Nation's efforts in achieving excellence in science, technology, engineering, and

mathematics (STEM) education or to stimulate interest in STEM through program-related public outreach activities.

4.0 WAIVERS LOG

Currently there are no STP program wide waivers to NPR 7120.5D. Individual projects will submit waivers to be included in the PLRA and maintain a waiver log as part of their Project Plan.

5.0 CHANGE LOG

Change Log

Revision Ltr/ Change No.	Description/ Pages Affected	CCR No.	Date Approved
Initial Release	All	460-7	6/25/01
A	Update for 7120.5D requirements		

6.0 APPENDICES

Appendix A Program Level Requirements Appendices (PLRA)
Level-1 Requirements – Magnetospheric Multiscale (MMS)

Refer to document no. 461-PROJ-RQMT-0018.

Appendix B Acronyms

AA	Associate Administrator
AO	Announcement of Opportunity
ASM	Acquisitions Strategy Meeting
CCB	Configuration Control Board
CM	Configuration Management
CMC	Center Management Council
CR	Confirmation Review
DD	Division Director
DOD	Department of Defense
EPO	Education and Public Outreach
FAD	Formulation Authorization Document
FAR	Federal Acquisition Regulation
FIPS	Federal Information Processing Standards
FOM	Facilities Operations Manager
FY	Fiscal Year
GEC	Global Electrodynamics Connections
GPR	Goddard Procedural Requirement
GPRA	Government Performance and Results Act
GSFC	Goddard Space Flight Center

HQ	Headquarters
IBPD	Integrated Budget and Performance Document
IT	Information Technology
JAXA	Japanese Aerospace Exploration Agency
KDP	Key Decision Point
LCC	Life-Cycle Cost
MC	Magnetospheric Constellation
MDR	Mission Design Review
MMS	Magnetospheric Multiscale
MSR	Monthly Status Review
NAC	NASA Advisory Council
NAR	Non-Advocate Review
NASA	National Aeronautics and Space Administration
NCS	Nonconformance Report
NIST	National Institute of Standards and Technology
NPD	NASA Policy Directive
NPR	NASA Procedural Requirements
NRA	NASA Research Announcement
PA	Program Analyst
PBR	President's Budget Request
PCA	Program Commitment Agreement
PE	Program Executive
PI	Principal Investigator

PLRA	Program Level Requirements Appendices
PMC	Program Management Council
PS	Project Scientist
ROSES	Research Opportunities in Earth and Space Sciences
SEMP	System Engineering Management Plan
SMA	Safety and Mission Assurance
SMD	Science Mission Directorate
SOMD	Space Operations Mission Directorate
SRB	Standing Review Board
STDT	Science and Technology Definition Team
STEM	Science, Technology, Engineering, and Mathematics
STEREO	Solar Terrestrial Relations Observatory
STP	Solar Terrestrial Probes
TA	Technical Authority
TIMED	Thermosphere Ionosphere Mesosphere Energetics and Dynamics
US	United States
WBS	Work Breakdown Structure