NASA Procedural Requirements

NPR 7120.5F
Effective Date: August 03, 2021
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COMPLIANCE IS MANDATORY FOR NASA EMPLOYEES

NASA Space Flight Program and Project Management Requirements

Responsible Office: Associate Administrator

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Preface

P.1 Purpose

This document establishes the requirements by which NASA formulates and implements space flight programs and projects, consistent with the governance model contained in NASA Policy Directive (NPD) 1000.0, NASA Governance and Strategic Management Handbook.

P.2 Applicability

a. This NASA Procedural Requirements (NPR) is applicable to NASA Headquarters (HQ) and NASA Centers, including Component Facilities and Technical and Service Support Centers. This language applies to the Jet Propulsion Laboratory (a Federally Funded Research and Development Center), other contractors and recipients of grants, cooperative agreements, or other agreements, only to the extent specified or referenced in the applicable contracts, grants, or agreements.

b. This NPR applies to all NASA space flight programs and projects including spacecraft, launch vehicles, instruments developed for space flight programs and projects, some research and technology (R&T) developments [1] funded by and to be incorporated into space flight or aeronautics programs and projects, technical facilities specifically developed or significantly modified for space flight systems, Information Technology (IT) acquired as a part of space flight programs and projects, and ground systems that are in direct support of space flight operations. This NPR also applies to reimbursable space flight programs and projects performed for non-NASA sponsors and to NASA contributions to space flight programs and projects performed with international and interagency partners.

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[1] Â R&T programs and projects that are directly funded by a space flight program/project should decide whether they are subject to NPR 7120.5, NPR 7120.8, or will be a hybrid between those two per Mission Directorate policy and Decision Authority (DA) approval. R&T projects that directly tie to the space flight missionâ??s success and schedule are normally managed under NPR 7120.5.

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c. For existing programs and projects, the Revision F changes to the requirements of this NPR apply to their current and future phases as determined by the responsible Mission Directorate and concurred with by the NASA Chief Engineer (or as delegated) and the Decision Authority.

d. This NPR can be applied to other NASA investments at the discretion of the responsible manager or the NASA Associate Administrator.

e. In this directive, all mandatory actions (i.e., requirements) are denoted by statements containing the term "shall." The terms "may" or "can" denote discretionary privilege or permission, "should" denotes a good practice and is recommended but not required, "will" denotes expected outcome, and "are/is" denotes descriptive material.

f. In this directive, all document citations are assumed to be the latest version unless otherwise noted. Documents cited as authority, applicable, or reference documents may be cited as a different categorization, which characterizes its function in relation to the specific context.

P.3 Authority

a. The National Aeronautics and Space Act, as amended, 51 U.S.C. § 20113(a).

b. NPD 1000.0, NASA Governance and Strategic Management Handbook.

c. NPD 1000.3, The NASA Organization.

d. NPD 1000.5, Policy for NASA Acquisition.

e. NPD 1001.0, NASA Strategic Plan.

f. NPD 7120.4, NASA Engineering and Program/Project Management Policy.

P.4 Applicable Documents and Forms

a. NASA Federal Acquisition Regulation (FAR) Supplement (NFS), 48 Code of Federal Regulation (CFR), Chapter 18.

b. NPD 7500.1, Program and Project Life-Cycle Logistics Support Policy.

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

d. NPR 1040.1, NASA Continuity of Operations (COOP) Planning Procedural Requirements.

e. NPR 1058.1, NASA Enterprise Protection Program.

f. NPR 1600.1, NASA Security Program Procedural Requirements.

g. NPR 2190.1, NASA Export Control Program.

h. NPR 2810.1, Security of Information Technology.

i. NPR 7120.10, Technical Standards for NASA Programs and Projects.

j. NPR 7123.1, NASA Systems Engineering Processes and Requirements.

k. NPR 7150.2, NASA Software Engineering Requirements.

l. NPR 8000.4, Agency Risk Management Procedural Requirements.

m. NPR 8020.12, Planetary Protection Provisions for Robotic Extraterrestrial Missions.

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

o. NPR 8600.1, NASA Capability Portfolio Management Requirements.

p. NPR 8705.2, Human-Rating Requirements for Space Systems.

q. NPR 8705.4, Risk Classification for NASA Payloads.

r. NID 7120.132, Collision Avoidance for Space Environment Protection.
https://nodis3.gsfc.nasa.gov/OPD_docs/NID_7120_132_.pdf

s. NASA/SP-2016-3706, NASA Standing Review Board Handbook.
https://ntrs.nasa.gov/citations/20140008530

t. EIA-748, Standard for Earned Value Management Systems.

P.5 Measurement/Verification

a. Compliance with this document is verified by submitting the gate products identified in this document at Key Decision Points (KDPs) to responsible NASA officials and milestone products and control plans due at life-cycle reviews (LCRs) and by internal and external controls. Internal controls are consistent with processes per NPD 1200.1, NASA Internal Control. Internal controls include surveys, audits, and reviews conducted in accordance with NPD 1210.2, NASA Surveys, Audits, and Reviews Policy. External controls may include external surveys, audits, and reporting requirements.

b. Compliance is also documented by appending a completed Compliance Matrix for this NPR (see Appendix C) to the Formulation Agreement for projects in Formulation and/or the Program Plan or Project Plan (see appendices G or H) for programs or projects entering or in Implementation. A copy of the Compliance Matrix is forwarded to the Office of the Chief Engineer. Organizations with authority to approve waivers or deviations to specific requirements are specified in Appendix C, Table C-1, Compliance Matrix.

P.6 Cancellation

a. NPR 7120.5E, NASA Space Flight Program and Project Management Requirements, dated August 14, 2012.

b. NID 7120.130, NASA Space Flight Program and Project Management Requirements - Space Systems Protection Standard Update.

c. NID 7120.122, Joint Cost and Schedule Confidence Level (JCL) Requirements Updates.

Chapter 1. Introduction

1.1 Key Policy Changes to NPR 7120.5 Revision F Since Revision E

1.1.1 Key policy changes in NPR 7120.5F, NASA Space Flight Program and Project Management Requirements, include updating the requirements for establishing Agency Baseline Commitments (ABC) and for performing Joint Cost and Schedule Confidence Level (JCL) analyses for tightly coupled programs, adding additional requirements for doing a JCL analysis for single-project programs and projects over $1B life-cycle cost (LCC), and using initial capability cost estimates instead of LCC estimates in specific, identified instances for single-project programs and projects that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point.

1.1.2 Per NPD 1000.0, NASA Governance and Strategic Management Handbook, tailoring is both accepted and expected. Tailoring guidance has been added to Appendix C along with a reference to a tailoring Web site that includes resources to facilitate tailoring the requirements in this NPR. Changes to tailoring guidance include clarifying the process for assigning "non-applicable" to requirements and modifying stand-alone requirements for program and project control plans; flexibility for programs using innovative acquisition approaches; clarification of delegation of tailoring authority; and pre-customization of the NPR 7120.5 Compliance Matrix. Requirements for tailoring are in Section 3.5.

1.1.3 With the release of the NASA-STD-1006, Space System Protection Standard and NPR 1058.1, NASA Enterprise Protection Program, Space Asset Protection is now the Mission Resiliency and Protection Program. Programs are no longer required to do a Threat Summary, and Project Protection Plans need to address the new standard and NPR.

1.1.4 Changes related to governance include updates to program and project acquisition strategy and planning aligned with NPD 1000.5, Policy for NASA Acquisition; shifted responsibility for management of independent reviews from the Independent Program Assessment Office to Mission Directorates; and added program and project consideration for management and utilization of Agency-level capability components through capability portfolios per NPR 8600.1, NASA Capability Portfolio Management Requirements. The Dissenting Opinion process is now the Formal Dissent process, which retains the current process augmented with an expedited escalation path.

1.1.5 Changes to the life cycle include clarification of the criteria triggering a Program Implementation Review (PIR), adding emphasis to the use of Leading Indicators in life-cycle reviews (LCRs) and Key Decision Points (KDPs), and providing additional guidance in the NASA Common Leading Indicators Detailed Reference Guide at https://nodis3.gsfc.nasa.gov/OCE_rep/OCE_list.cfm.

1.1.6 Updates to program and project documentation and guidance include changes to the Appendix I table documentation and products developed during the life cycle. This includes the addition of the Human Systems Integration Plan, System Security Plan, Quality Assurance Surveillance Plan, Orbital Collision Avoidance Plan, and Performance Measurement Baseline and the deletion of the Education Plan, Information Technology Plan, and Product Data and Life Cycle Management Plan.

In addition, this NPR adds reference to NASA/SP-2016-3424, NASA Project Planning and Control Handbook.

1.2 Background

1.2.1 NASA space flight programs and projects develop and operate a wide variety of spacecraft, launch vehicles, in-space facilities, communications networks, instruments, and supporting ground systems.[2] This document establishes a standard of uniformity for the process by which NASA formulates and implements space flight programs and projects.

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[2]Â NASA space flight programs and projects often need to mature technologies to meet mission goals. These enabling and/or enhancing technologies are also covered by this NPR, insofar as developments of those technologies apply per Section P.2(b) above.

1.2.2 NASA approaches the formulation and implementation of programs and projects through a governance model that balances different perspectives from different elements of the organization. The cornerstone of program and project governance is the organizational separation of the Programmatic Authorities from the Institutional Authorities. The Programmatic Authorities include the Mission Directorates and their respective programs and projects. The Institutional Authorities include the Mission Support Directorate and other mission support offices (e.g., engineering, safety and mission assurance, information technology, procurement, and health and medical) and Center Directors and Center organizations that align with these mission support offices. (See NPD 1000.0, NASA Governance and Strategic Management Handbook and NASA/SP-2014-3705, NASA Space Flight Program and Project Management Handbook.)

1.2.3 This NPR distinguishes between "programmatic requirements" and "institutional requirements." Both categories of requirements ultimately need to be satisfied in program and project Formulation and Implementation.

1.2.3.1 Programmatic requirements are the responsibility of the Programmatic Authorities. Programmatic requirements focus on the products to be developed and delivered and specifically relate to the goals and objectives of a particular NASA program or project. These programmatic requirements flow down from the Agency's strategic planning process. Table 1-1 shows this flow down from Agency strategic planning through Agency, directorate, program, and project requirement levels to the systems that will be implemented to achieve the Agency goals.

Table 1-1 Programmatic Requirements Hierarchy

Requirements Level	Content	Governing Document	Approver	Originator
NASA Strategic Goals	Agency goals, objectives, and strategic direction	NPD 1001.0, NASA Strategic Plan; and Strategic Planning Guidance	NASA Admin-istrator	OCFO

Mission Directorate Requirements	High-level requirements levied on a program to carry out strategic and architectural direction, including programmatic direction for initiating specific projects	Program Commitment Agreement (PCA)	NASA AA	MDAA
Program Requirements	Detailed requirements levied on a program to implement the PCA and high-level programmatic requirements allocated from the program to its projects	Program Plan	MDAA	Program Manager
Project Requirements	Detailed requirements levied on a project to implement the Program Plan and flow down programmatic requirements allocated from the program to the project	Project Plan	Program Manager	Project Manager
System Requirements	Detailed requirements allocated from the project to the next lower level of the project	System Requirements Documentation	Project Manager	Responsible System Lead

MDAA = Mission Directorate Associate Administrator; NASA AA = NASA Associate Administrator

1.2.3.2 Institutional requirements are the responsibility of the Institutional Authorities. (See Section 3.3 for details on Technical Authority.) Institutional requirements focus on how NASA does business and are independent of any particular program or project. These requirements are issued by NASA HQ (including the Office of the Administrator, Mission Support Directorate, and other mission support offices) and by Center organizations. Institutional requirements may respond to Federal and State statute, regulation, treaty, or Executive Order. They are normally documented in NPDs, NPRs, NASA Standards, Center Policy Directives Center Procedural Requirements, and Mission Directorate requirements.

1.2.4 This NPR is focused on improving program and project performance against internal and external commitments. Figure 1-1 shows the flow down from NPD 1000.0, NASA Governance and

Strategic Management Handbook through Program and Project Plans. The figure identifies the five types of institutional requirements that flow down to these plans: engineering, program/project management, safety and mission assurance, health and medical, and mission support requirements. These terms are defined in Appendix A.

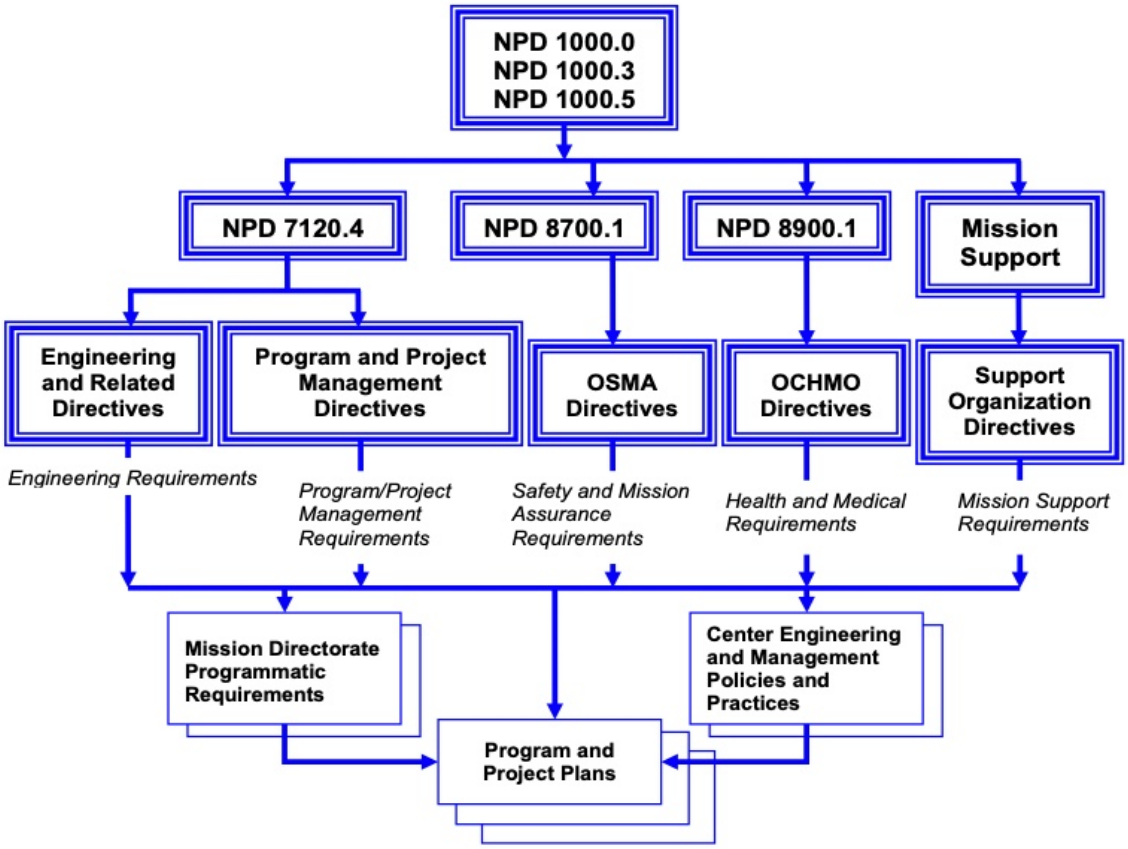

Figure 1-1 Institutional Requirements Flow Down

1.3 Overview of Management Process

1.3.1 Although this document emphasizes program and project management based on life cycles, Key Decision Points (KDPs), and evolving programmatic products during each life-cycle phase, these elements are embedded in NASA's four-part process for managing programs and projects, which consists of:

a. Formulation—identifying how the program or project supports the Agency's strategic goals; assessing feasibility, technology, and concepts; performing trade studies; assessing and possibly mitigating risks based on risk-informed decision making (RIDM) and continuous risk management (CRM) processes; maturing technologies; building teams; developing system-level preliminary designs; developing operations concepts and acquisition strategies; establishing high-level requirements, requirements flow down, and success criteria; assessing the relevant industrial base/supply chain to ensure program or project success; preparing plans, cost estimates, budget submissions, and schedules essential to the success of a program or project; and establishing control systems to ensure performance of those plans and alignment with current Agency strategies.

b. Approval (for Implementation)—acknowledgment by the Decision Authority (see Appendix A for definition of "Decision Authority") that the program/project has met Formulation requirements and is ready to proceed to Implementation. By approving a program/project, the Decision Authority commits to the time-phased cost plan based on technical scope and schedule necessary to continue into Implementation.

c. Implementation—execution of approved plans for the development and operation of the program/project and use of control systems to ensure performance to approved plans and requirements and continued alignment with the Agency's strategic goals.

d. Evaluation—continual self and independent assessment of the performance of a program or project and incorporation of the assessment findings to ensure adequacy of planning and execution according to approved plans and requirements.

1.4 Acquisition

1.4.1 NASA's program and project support of its overall mission is long term in nature, but the environment in which these programs and projects are conducted is dynamic. In recognition of this, NPD 1000.0, NASA Governance and Strategic Management Handbook and NPD 1000.5, Policy for NASA Acquisition have put in place a framework for ensuring that NASA's strategic vision, programs and projects, and resources remain properly aligned. The acquisition process and annual strategic resource planning form a continuous process to oversee this alignment. In addition, the Agency's senior Acquisition Strategy Council (ASC) makes decisions regarding strategic resource planning, specific acquisition strategy approval, and acquisition policy integration and performance.

1.4.2 All programs and projects implement acquisitions consistent with NPD 1000.5, Policy for NASA Acquisition. At the program and project level, the Pre-Acquisition Strategy Meeting (Pre-ASM), the Acquisition Strategy Meeting (ASM), and the Procurement Strategy Meeting (PSM) support the Agency's acquisition process, which includes strategic planning as well as procurement. Information on Pre-ASMs and ASMs, the associated convening authorities, and criteria for determining the convening authority is provided in NPD 1000.5, Policy for NASA Acquisition and its NASA Advisory Implementing Instructions. The PSM is described in NASA FAR Supplement (NFS) 1807.170-71. The PSM guide may be accessed at https://nasa.sharepoint.com/sites/procurement/Shared Documents/Forms/AgencyWide Procurement Templates.aspx?id=%2Fsites%2Fprocurement%2FShared Documents%2FNASA PSM Guide%2Epdf&parent=%2Fsites%2Fprocurement%2FShared Documents or by contacting the Office of Procurement.

1.5 Document Structure

1.5.1 Chapter 2 defines the different types of programs and projects, their documents, and how they mature through their different life cycles. It also describes how to establish baselines and approval processes. Chapter 3 describes roles and responsibilities relevant to program and project managers, the governance structure, Technical Authority (TA), the dissent process, and how to tailor requirements. Appendix C contains the Compliance Matrix and tailoring guidance and resources. Templates for required program and project documents are contained in appendices D through H. Appendix I encompasses the tables of program and project products by phase. Appendix J provides

a list of references.

1.5.2 The companion handbook to this NPR, NASA/SP-2014-3705, NASA Space Flight Program and Project Management Handbook, describes how programs and projects are managed in NASA and contains explanatory material and context to help understand the requirements of this NPR and how to implement them. In addition, NASA/SP-2016-3706, NASA Standing Review Board Handbook is closely aligned to this NPR and provides guidance for the planning, preparation, review, reporting, and closeout of Standing Review Board (SRB) activities. These Handbooks can be found on the "Other NASA-Level Documents" menu in the NASA Online Directives Information System (NODIS) under the tab for the Office of the Chief Engineer (OCE).

Chapter 2. NASA Life Cycles for Space Flight Programs and Projects

2.1 Programs and Projects

2.1.1 Space flight programs and projects flow from the implementation of national priorities, defined in the Agency's Strategic Plan, through the Agency's Mission Directorates, as part of the Agency's general work breakdown hierarchy shown in Figure 2-1.

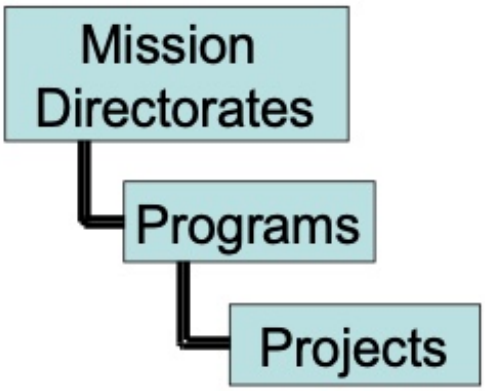

Figure 2-1 Programmatic Authority Organizational Hierarchy

2.1.1.1 This hierarchical relationship of programs to projects shows that programs and projects are different, and their management involves different activities and focus. Programs and projects are distinguished by the following characteristics.

a. Program—Programs are a strategic investment by Mission Directorates or mission support offices with a defined architecture and/or technical approach, requirements, funding level, and a management structure that initiates and directs one or more projects. A program implements a strategic direction that the Agency has identified as needed to accomplish Agency goals and objectives.

b. Project—Space flight projects are a specific investment identified in a Program Plan having defined requirements, a life-cycle cost, a beginning, and an end. A project also has a management structure and may have interfaces to other projects, agencies, and international partners. A project yields new or revised products that directly address NASA's strategic goals.

2.1.1.2 Regardless of the structure of a program or project meeting the criteria of Section P.2, this NPR shall apply to the full scope of the program or project and all the activities under it. Specific NPR 7120.5 requirements are flowed down to these activities to the extent necessary for the program or project to ensure compliance and mission success. See Section 3.5.6.1 for the process of obtaining any required deviations or waivers.

2.1.2 NASA Programs

2.1.2.1 NASA space flight programs are initiated and implemented to accomplish scientific or

exploration goals that generally require a collection of mutually supporting projects. Programs integrate and manage these projects over time and provide on-going enabling systems, activities, methods, technology developments, and feedback to projects and stakeholders. Programs are generally created by a Mission Directorate with a long-term horizon in mind, though as the Agency's strategic direction or circumstances change, a Mission Directorate occasionally needs to replan its programs or combine related programs to increase effectiveness. Programs are generally executed at NASA Centers under the direction of the Mission Directorate and are assigned to Centers based on decisions made by Agency senior management consistent with the results of the Agency's strategic acquisition planning process. Because the scientific and exploration goals of programs vary significantly, different program implementation strategies are required, ranging from simple to complex. To accommodate these differences, NASA identifies four basic types of programs (described below and defined in Appendix A) that may be employed: single-project programs, uncoupled programs, loosely coupled programs, and tightly coupled programs. Characteristics of the program types are:

a. **Single-Project:** These programs (e.g., James Webb Space Telescope) tend to have long development and operational lifetimes and represent a large investment of Agency resources. Multiple organizations or agencies contribute to them. Single-project programs have one project and implement their program objectives and requirements through one of two management approaches: (1) separate program and project structures or (2) a combined structure. The requirements for both programs and projects apply to single-project programs as described in this NPR.

b. **Uncoupled:** These programs (e.g., Discovery Program) are implemented under a broad theme (like planetary science) and/or a common program implementation mechanism, such as providing flight opportunities for formally competed cost-capped projects or Principal Investigator (PI)-led missions and investigations. Each project in an uncoupled program is independent of the other projects within the program.

c. **Loosely Coupled:** These programs (e.g., Mars Exploration Program) address specific objectives through multiple space flight projects of varied scope. While each project has an independent set of mission objectives, the projects as a whole have architectural and technological synergies and strategies that benefit the program. For example, Mars orbiters designed for more than one Mars year in orbit are required to carry a communication system to support present and future landers.

d. **Tightly Coupled:** These programs have multiple projects that execute portions of a mission or missions. No single project is capable of implementing a complete mission. Typically, multiple NASA Centers contribute to the program. Individual projects may be managed at different Centers. The program may also include other agency or international partner contributions.

2.1.3 NASA Projects

2.1.3.1 As with programs, projects vary in scope and complexity and thus require varying levels of management requirements and Agency attention and oversight. Consequently, project categorization defines Agency expectations of project managers by determining both the oversight council and the specific approval requirements. Projects are Category 1, 2, or 3 and shall be assigned to a category based initially on: (1) the project life-cycle cost (LCC) estimate, the inclusion of significant radioactive material [3] , and whether or not the system being developed is for human space flight; and (2) the priority level, which is related to the importance of the activity to NASA, the extent of international participation (or joint effort with other government agencies), the degree of uncertainty surrounding the application of new or untested technologies, and spacecraft/payload development risk classification. (See NPR 8705.4, Risk Classification for NASA Payloads.) Guidelines for

determining project categorization are shown in Table 2-1, but categorization may be changed based on recommendations by the Mission Directorate Associate Administrator (MDAA), who considers additional risk factors facing the project. Projects that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point are assigned to Category 1 unless otherwise agreed to by the Decision Authority. (See Section 2.4.1.3.b and Section 2.4.1.6.) The NASA Associate Administrator (AA) approves the final project categorization. The project category is identified in the Formulation Authorization Document (FAD) and Project Plan and documented in the KDP B Decision Memorandum. The Office of the Chief Financial Officer (OCFO) is responsible for the official listing of NASA programs and projects. [4] For purposes of project categorization, the project LCC estimate includes phases A through F and all Work Breakdown Structure (WBS) Level 2 elements and is measured in real-year (nominal) dollars.

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[3]Â Significant radioactive material is defined as levels of radioactive material onboard the spacecraft and/or launch vehicle that require nuclear launch authorization by the Administrator or Executive Office of the President as described in NPR 8715.3, NASA General Safety Program Requirements.

[4]Â This data is maintained by OCFO in a database called the Meta-Data Manager (MdM). This database is the basis for the Agencyâ??s work breakdown and forms the structure for program and project status reporting across all Mission Directorates and mission support offices.

Table 2-1 Project Categorization Guidelines

Priority Level	LCC < $365M	$365M ≤ LCC ≤ $2B	LCC > $2B, significant radioactive material, or human space flight
High	Category 2	Category 2	Category 1
Medium	Category 3	Category 2	Category 1
Low	Category 3	Category 2	Category 1

2.1.3.2 When projects are initiated, they are assigned to a NASA Center or implementing organization by the MDAA consistent with direction and guidance from the strategic planning process. They are either assigned directly to a Center by the Mission Directorate or are selected through a competitive process such as an Announcement of Opportunity (AO). [5] For Category 1 projects, the assignment of a project to a Center or implementing organization shall be with the concurrence of the NASA AA.

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[5]Â As part of the process of assigning projects to NASA Centers, the affected program manager may recommend project assignments to the MDAA.

2.1.4 Program and Project Manager Certification

2.1.4.1 Programs and projects with a LCC or initial capability cost (see Section 2.4.1.3.b) greater than $250M shall be managed by program and project managers who have been certified in

compliance with Office of Management and Budget (OMB)'s promulgated Federal acquisition program/project management certification requirements. This certification is required within one year of appointment. Further information on how NASA is implementing program and project manager certification can be found in the NASA Space Flight Program and Project Management Handbook.

2.2 Program and Project Life Cycles

2.2.1 Program and project managers shall follow their appropriate life cycle, which includes life-cycle phases; life-cycle gates and major events, including KDPs; major life-cycle reviews (LCRs); principal documents that govern the conduct of each phase; and the process of recycling through Formulation when program changes warrant such action. Uncoupled and loosely coupled programs follow the life cycle depicted in Figure 2-2. Tightly coupled programs follow the life cycle shown in Figure 2-3. Single-project programs follow the life cycle shown in Figure 2-4. Projects follow the life cycle shown in Figure 2-5.

2.2.2 Each program and project performs the work required for each phase, which is described in the NASA Space Flight Program and Project Management Handbook; NASA/SP-2016-3424, NASA Project Planning and Control Handbook, which covers the functions and activities of the planning and control community; NPR 7123.1, NASA Systems Engineering Processes and Requirements; and NPR 7150.2, NASA Software Engineering Requirements. Program and project managers shall organize the work required for each phase using a product-based WBS developed in accordance with the Program and Project Plan templates (appendices G and H). Additional information on the NASA WBS structure is provided in the NASA Work Breakdown Structure (WBS) Handbook, NASA/SP-2010-3404, which can be found in NODIS on the OCE tab under the "Other NASA-Level Documents" menu. When an alternate approach provides for better program/project implementation, the program/project manager should tailor the requirement as noted in the Compliance Matrix. (See Appendix C.)

2.2.3 The documents shown on the life-cycle figures and described below shall be prepared in accordance with the templates in appendices D, E, F, G, and H.

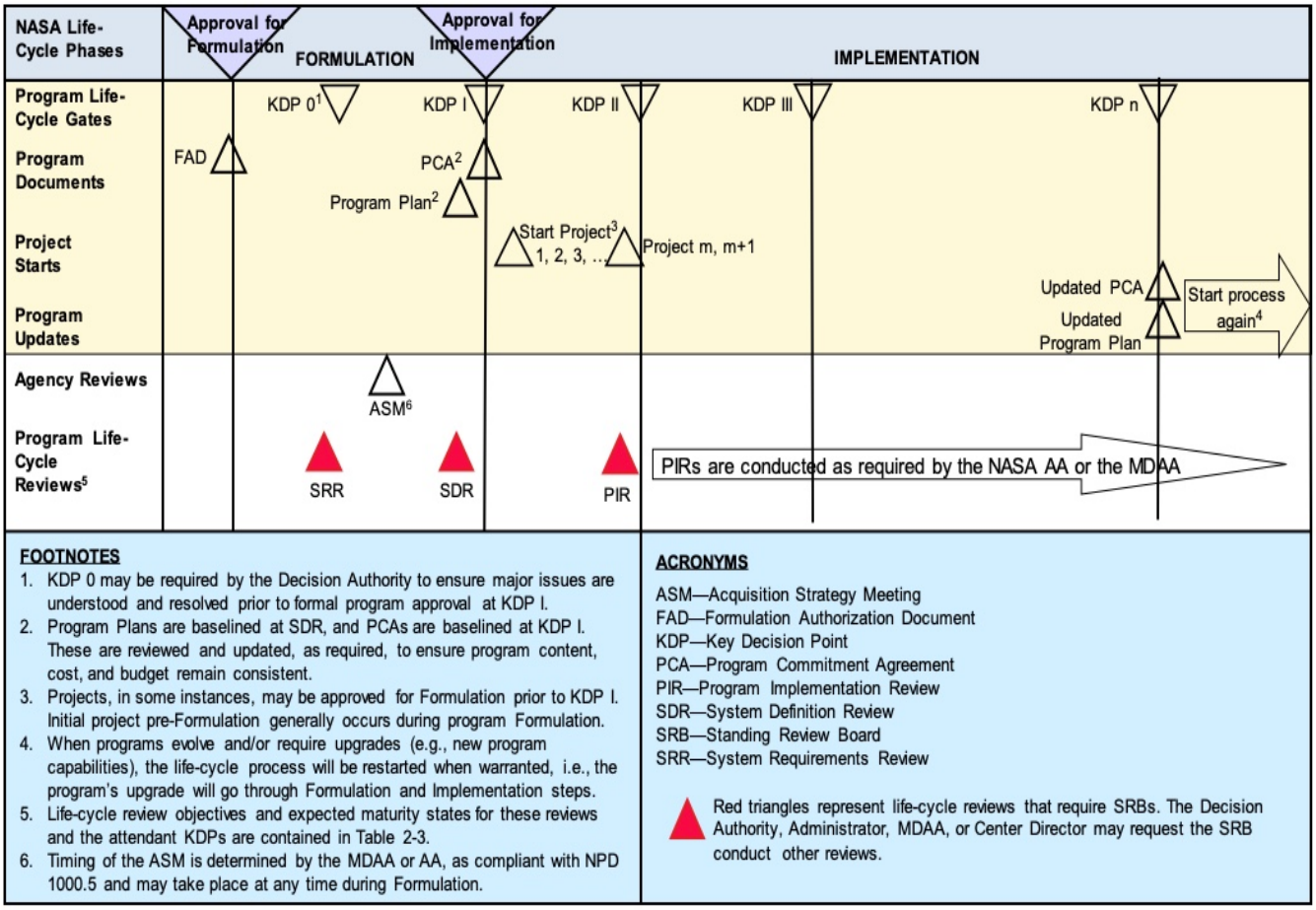
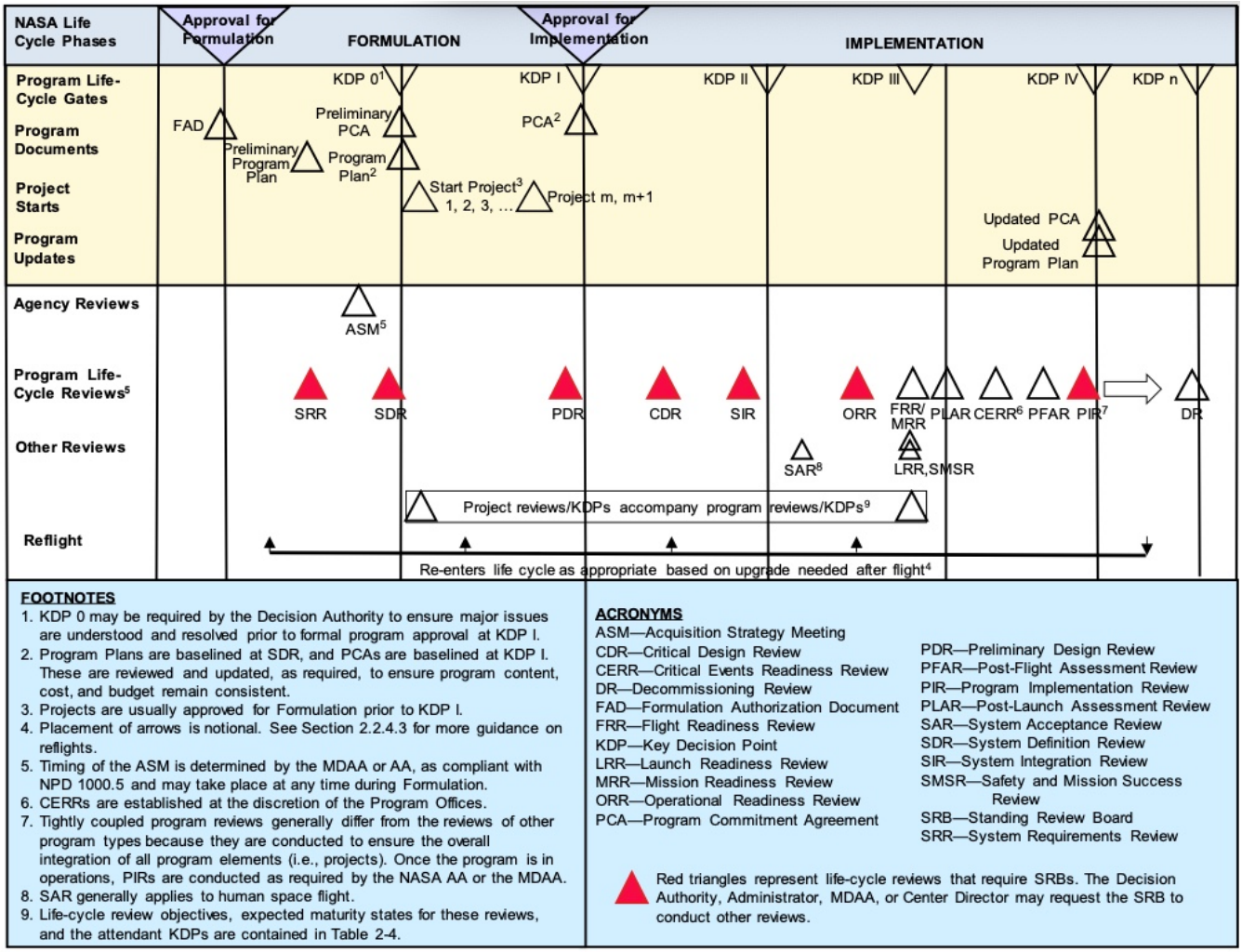


Figure 2-2 NASA Uncoupled and Loosely Coupled Program Life Cycle



FOOTNOTES

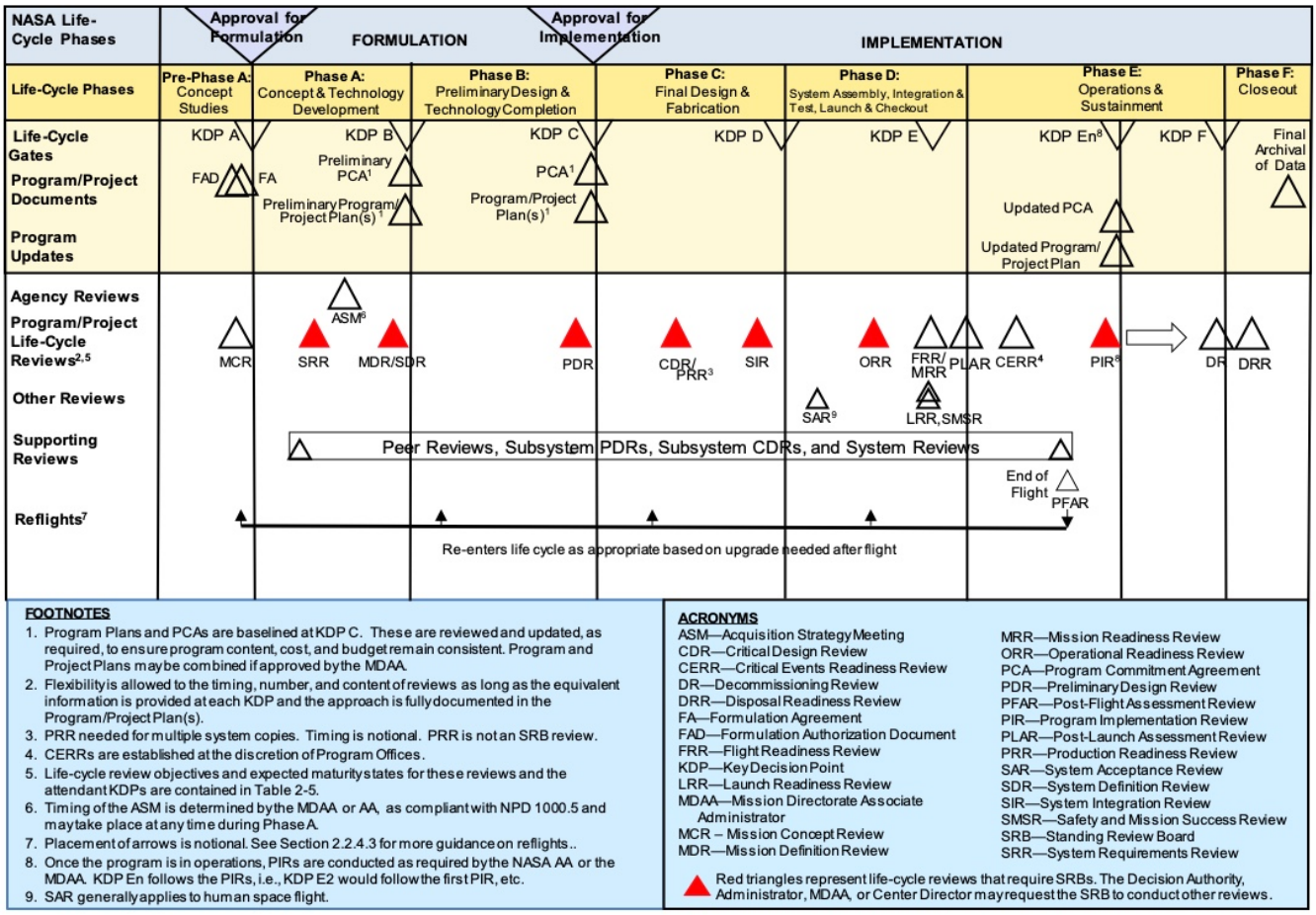
1. KDP 0 may be required by the Decision Authority to ensure major issues are understood and resolved prior to formal program approval at KDP I.
2. Program Plans are baselined at SDR, and PCAs are baselined at KDP I. These are reviewed and updated, as required, to ensure program content, cost, and budget remain consistent.
3. Projects are usually approved for Formulation prior to KDP I.
4. Placement of arrows is notional. See Section 2.2.4.3 for more guidance on reflights.
5. Timing of the ASM is determined by the MDAA or AA, as compliant with NPD 1000.5 and may take place at any time during Formulation.
6. CERRs are established at the discretion of the Program Offices.
7. Tightly coupled program reviews generally differ from the reviews of other program types because they are conducted to ensure the overall integration of all program elements (i.e., projects). Once the program is in operations, PIRs are conducted as required by the NASA AA or the MDAA.
8. SAR generally applies to human space flight.
9. Life-cycle review objectives, expected maturity states for these reviews, and the attendant KDPs are contained in Table 2-4.

ACRONYMS

ASM—Acquisition Strategy Meeting
CDR—Critical Design Review
CERR—Critical Events Readiness Review
DR—Decommissioning Review
FAD—Formulation Authorization Document
FRR—Flight Readiness Review
KDP—Key Decision Point
LRR—Launch Readiness Review
MRR—Mission Readiness Review
ORR—Operational Readiness Review
PCA—Program Commitment Agreement
PDR—Preliminary Design Review
PFAR—Post-Flight Assessment Review
PIR—Program Implementation Review
PLAR—Post-Launch Assessment Review
SAR—System Acceptance Review
SDR—System Definition Review
SIR—System Integration Review
SMSR—Safety and Mission Success Review
SRB—Standing Review Board
SRR—System Requirements Review

Red triangles represent life-cycle reviews that require SRBs. The Decision Authority, Administrator, MDAA, or Center Director may request the SRB to conduct other reviews.

Figure 2-3 NASA Tightly Coupled Program Life Cycle



FOOTNOTES

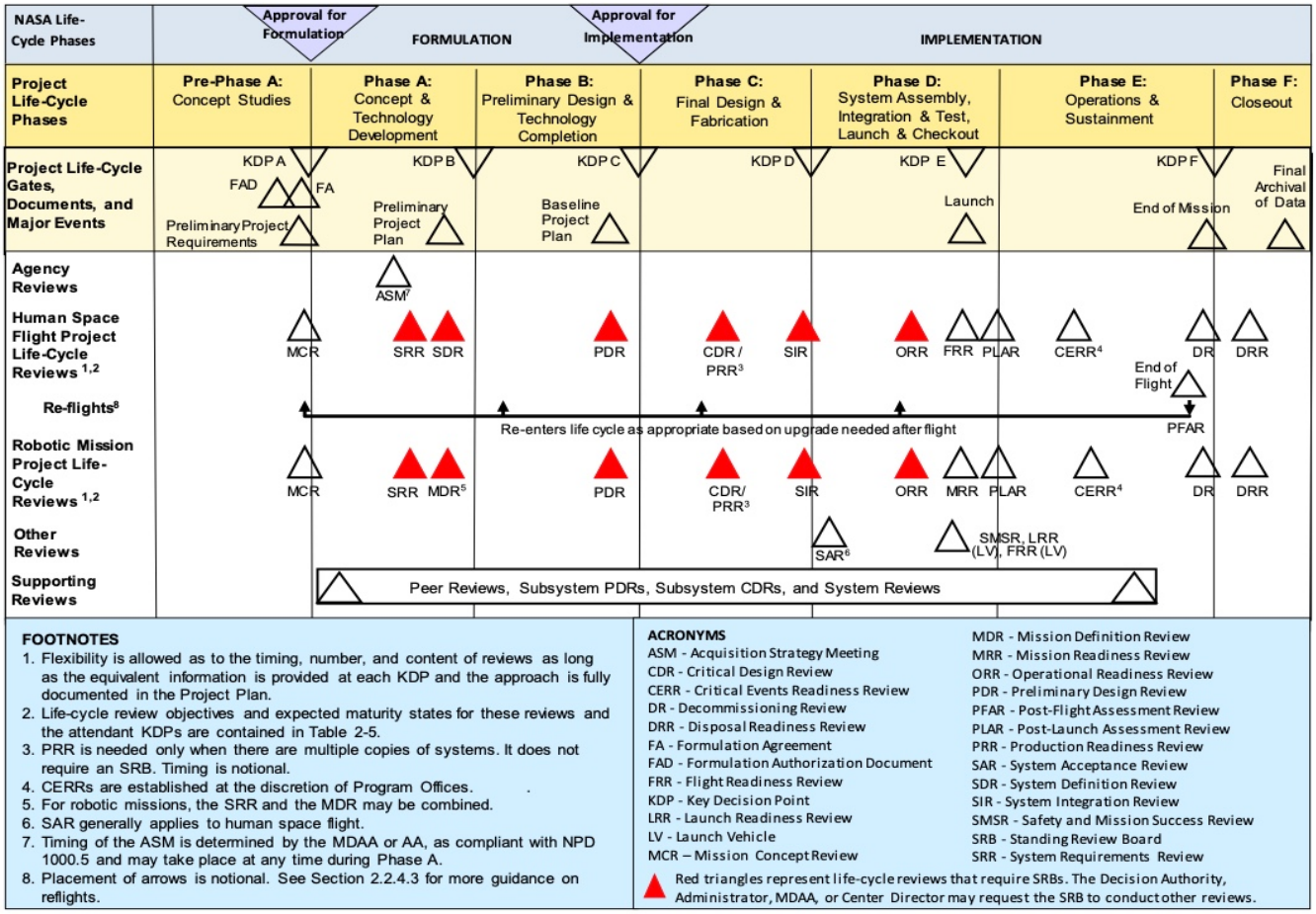
1. Program Plans and PCAs are baselined at KDP C. These are reviewed and updated, as required, to ensure program content, cost, and budget remain consistent. Program and Project Plans may be combined if approved by the MDAA.
2. Flexibility is allowed to the timing, number, and content of reviews as long as the equivalent information is provided at each KDP and the approach is fully documented in the Program/Project Plan(s).
3. PRR needed for multiple system copies. Timing is notional. PRR is not an SRB review.
4. CERRs are established at the discretion of Program Offices.
5. Life-cycle review objectives and expected maturity states for these reviews and the attendant KDPs are contained in Table 2-5.
6. Timing of the ASM is determined by the MDAA or AA, as compliant with NPD 1000.5 and may take place at any time during Phase A.
7. Placement of arrows is notional. See Section 2.2.4.3 for more guidance on reflights..
8. Once the program is in operations, PIRs are conducted as required by the NASA AA or the MDAA. KDP En follows the PIRs, i.e., KDP E2 would follow the first PIR, etc.
9. SAR generally applies to human space flight.

ACRONYMS

ASM—Acquisition Strategy Meeting
CDR—Critical Design Review
CERR—Critical Events Readiness Review
DR—Decommissioning Review
DRR—Disposal Readiness Review
FA—Formulation Agreement
FAD—Formulation Authorization Document
FRR—Flight Readiness Review
KDP—Key Decision Point
LRR—Launch Readiness Review
MDAA—Mission Directorate Associate Administrator
MCR – Mission Concept Review
MDR—Mission Definition Review
MRR—Mission Readiness Review
ORR—Operational Readiness Review
PCA—Program Commitment Agreement
PDR—Preliminary Design Review
PFAR—Post-Flight Assessment Review
PIR—Program Implementation Review
PLAR—Post-Launch Assessment Review
PRR—Production Readiness Review
SAR—System Acceptance Review
SDR—System Definition Review
SIR—System Integration Review
SMSR—Safety and Mission Success Review
SRB—Standing Review Board
SRR—System Requirements Review

Red triangles represent life-cycle reviews that require SRBs. The Decision Authority, Administrator, MDAA, or Center Director may request the SRB to conduct other reviews.

Figure 2-4 NASA Single-Project Program Life Cycle



FOOTNOTES

1. Flexibility is allowed as to the timing, number, and content of reviews as long as the equivalent information is provided at each KDP and the approach is fully documented in the Project Plan.
2. Life-cycle review objectives and expected maturity states for these reviews and the attendant KDPs are contained in Table 2-5.
3. PRR is needed only when there are multiple copies of systems. It does not require an SRB. Timing is notional.
4. CERRs are established at the discretion of Program Offices.
5. For robotic missions, the SRR and the MDR may be combined.
6. SAR generally applies to human space flight.
7. Timing of the ASM is determined by the MDAA or AA, as compliant with NPD 1000.5 and may take place at any time during Phase A.
8. Placement of arrows is notional. See Section 2.2.4.3 for more guidance on reflights.

ACRONYMS

ASM - Acquisition Strategy Meeting
CDR - Critical Design Review
CERR - Critical Events Readiness Review
DR - Decommissioning Review
DRR - Disposal Readiness Review
FA - Formulation Agreement
FAD - Formulation Authorization Document
FRR - Flight Readiness Review
KDP - Key Decision Point
LRR - Launch Readiness Review
LV - Launch Vehicle
MCR – Mission Concept Review
MDR - Mission Definition Review
MRR - Mission Readiness Review
ORR - Operational Readiness Review
PDR - Preliminary Design Review
PFAR - Post-Flight Assessment Review
PLAR - Post-Launch Assessment Review
PRR - Production Readiness Review
SAR - System Acceptance Review
SDR - System Definition Review
SIR - System Integration Review
SMSR - Safety and Mission Success Review
SRB - Standing Review Board
SRR - System Requirements Review

Red triangles represent life-cycle reviews that require SRBs. The Decision Authority, Administrator, MDAA, or Center Director may request the SRB to conduct other reviews.

Figure 2-5 NASA Project Life Cycle

2.2.3.1 The program FAD (see Appendix E) is prepared by the Mission Directorate and authorizes a program manager to initiate the planning of a new program and to perform the analysis of alternatives required to formulate a sound Program Plan that contains project elements, requirements, schedules, and time-phased cost plans.

2.2.3.2 The Program Commitment Agreement (PCA) (see Appendix D) is an agreement between the MDAA and the NASA AA (the Decision Authority) that authorizes program transition from Formulation to Implementation. The PCA is prepared by the Mission Directorate and documents Agency requirements that flow down to the program, Mission Directorate requirements, program objectives, management and technical approach and associated architecture, technical performance, schedule, time-phased cost plans, safety and risk factors, internal and external agreements, LCRs, and all attendant top-level program requirements.

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

2.2.3.4 The project FAD (see Appendix E) is prepared by the Mission Directorate. It authorizes a project manager to initiate the planning of a new project and to perform the analysis of alternatives required to formulate a sound Formulation Agreement and subsequent Project Plan. The FAD

contains requirements, schedules, and project funding requirements.

2.2.3.5 The Formulation Agreement (see Appendix F) is prepared by the project in response to the FAD to establish the technical and acquisition work that needs to be conducted during Formulation and defines the schedule and funding requirements during Phase A and Phase B for that work.

2.2.3.6 The Project Plan (see Appendix H) is an agreement among the MDAA; the program manager; participating Center Director(s); the project manager; and for AO-selected missions, the principal investigator. [6] The Project Plan is prepared by the project manager with the support of the project team and defines at a high level the project's objectives, technical and management approach, environment within which the project operates, and commitments of the project to the program.

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[6]Â A principal investigator is a person who conceives an investigation and is responsible for carrying it out and reporting its results. In some cases, principal investigators from industry and academia act as project managers for smaller development efforts with NASA personnel providing oversight.

2.2.4 Each program and project shall perform the LCRs and KDPs identified in its respective life-cycle figure in accordance with NPR 7123.1, applicable Center practices, and the requirements of this document. These reviews provide a periodic assessment of the program's or project's technical and programmatic status and health at key points in the life cycle using six criteria: alignment with and contribution to Agency strategic goals, adequacy of management approach, adequacy of technical approach, adequacy of the integrated cost and schedule estimates and funding strategy, adequacy and availability of resources other than budget, and adequacy of the risk management approach. (For further guidance on addressing the six criteria, see NASA/SP-2016-3706, NASA Standing Review Board Handbook.) LCRs that occur at the end of each life-cycle phase are complete when the governing Program Management Council (PMC) and Decision Authority complete their assessment at the KDP and sign the Decision Memorandum. (See Section 2.4.1.)

2.2.4.1 NASA programs and projects that leverage commercial or other practices (e.g., Commercial Crew or Gateway programs) can employ tailoring approaches to accommodate these innovative acquisition strategies. Examples of tailoring approaches used by these programs are provided on the Agency Tailoring Web site at https://appel.nasa.gov/npr-7120-5-tailoring-resources.

2.2.4.2 The need for a PIR LCR is determined in one of two ways:

a. The NASA AA determines the need for a PIR based on the occurrence of a trigger and discussion with the Convening Authorities. The MDAA or an independent team member (Technical Authorities (TAs), OCFO) report to the NASA AA that a trigger for discussing the need for a PIR has occurred. This is reported at the Agency Program Management Council (APMC) during the annual review of Mission Directorate Independent Assessment Manifests. (For considerations that trigger a discussion on the need for a PIR see Considerations for a PIR in Appendix A.)

b. The NASA AA or MDAA, per their discretion, determine that a PIR is needed.

2.2.4.3 Programs or projects that implement major upgrades as referenced in Section 2.4.1.6 will enter the life cycle at the appropriate LCR within the Formulation Phase. If other upgrades to a program or project are needed between flights, the program or project will re-enter the life cycle and perform the LCRs as necessary to demonstrate technical, cost, and schedule maturity for those

upgrades through the applicable Formulation and/or Implementation phases.

2.2.5 Program or project managers and an independent Standing Review Board (SRB) shall conduct the System Requirements Review (SRR), System Definition Review (SDR)/ Mission Definition Review (MDR), Preliminary Design Review (PDR), Critical Design Review (CDR), System Integration Review (SIR), Operational Readiness Review (ORR), and PIR LCRs in figures 2-2, 2-3, 2-4, and 2-5. LCRs that do not require an SRB will be convened by the Center Director (or designee) of the Center responsible for the program or project management.

a. The program or project manager determines whether one- or two-step reviews will be conducted. (See the NASA/SP-2016-3706, NASA Standing Review Board Handbook and the NASA Space Flight Program and Project Management Handbook for further guidance on the review processes conducted by the SRB, including one- and two-step reviews.)

b. Small Category 3, Class D projects with a life-cycle cost of under $150M should refer to NASA guidance on using an independent review team to perform independent assessments of the project in place of an SRB. General NASA guidance is provided in “Guidance for Tailoring 7120.5 Requirements for Small Cat 3/Class D Projects,” which can be found in NODIS on the OCE tab under the “Other NASA-Level Documents” menu.

2.2.5.1 NASA accords special importance to the policies and procedures established to ensure the integrity of the SRB’s independent review process and to comply with Federal law. The Conflict of Interest (COI) procedures detailed in the NASA Standing Review Board Handbook shall be strictly adhered to.

2.2.5.2 The portion of the LCRs conducted by the SRB shall be convened by the Convening Authorities in accordance with Table 2-2. The scope and requirements for this review will be documented in a Terms of Reference (ToR), for which there is a template in the NASA Standing Review Board Handbook.

Table 2-2 Convening Authorities for Standing Review Board

	Decision Authority		**Technical Authority**		**Chief Financial Officer****
	NASA AA	**MDAA**	**NASA CE***	**Center Director(s)**	
Programs	Approve	Approve	Concur	Approve	Concur
Category 1 Projects	Approve	Approve	Concur	Approve	Concur
Category 2 Projects		Approve	Concur	Approve	Concur
Category 3 Projects		Approve		Approve	Concur
NASA CE = NASA Chief Engineer					
*Concurrence is obtained via coordination with designated Mission Directorate Chief Engineer.					
** Concurrence is obtained via coordination with designated OCFO point of contact (POC) embedded in the Mission Directorate.					

NOTE: LCR entrance and success criteria in NPR 7123.1 and the life-cycle phase and KDP information in the NASA Space Flight Program and Project Management Handbook provide specifics for addressing the six criteria required to demonstrate the program or project has met expected maturity state.

2.2.5.3 The program or project manager, the SRB chair, and the Center Director (or designated Engineering Technical Authority (ETA) representative) shall mutually assess the program's or project's expected readiness for the LCR and report any disagreements to the Decision Authority for final decision. The assessment occurs approximately 30 to 90 calendar days prior to the LCR.

2.2.5.4 The Decision Authority may request the SRB to conduct other reviews identified on figures 2-2, 2-3, 2-4, and 2-5 or special reviews identified in Section 2.2.9. The Decision Authority may also request other special reviews that may or may not be conducted by the SRB. Examples of situations that may prompt such reviews include long periods of time (as determined at the discretion of the Decision Authority) between LCRs, between an LCR and when the subsequent KDP is scheduled, and between KDPs; key junctures in the life cycles of major programs, projects, or missions; and key aspect(s) of programs, projects, or missions of particular interest to the Agency. (See the NASA Space Flight Program and Project Management Handbook, Sections 3.1.3 and 4.1.3 for more information about special reviews.) The Decision Authority may also request informational briefings.

2.2.6 In preparation for these LCRs, the program or project manager shall generate the appropriate documentation per the Appendix I tables of this document, NPR 7123.1, and Center practices, as necessary, to demonstrate that the program's or project's definition and associated plans are sufficiently mature to execute the follow-on phase(s) with acceptable technical, safety, and programmatic risk.

2.2.6.1 For a single-project program that is implemented through separate program and project structures, the MDAA and single-project program manager will determine which of the documents in the tables are produced by the program and which are produced by the project. In both management approaches, the Program and Project Plans may be combined if approved by the MDAA.

2.2.7 Each program and project proceeds through the KDPs identified in its respective life-cycle figure. A KDP is the event where the Decision Authority determines the readiness of a program or project to progress to the next phase of the life cycle and establishes the content, cost, and schedule commitments for the ensuing phase(s). Transition to the following phase occurs immediately following KDP approval except for the transition from Phase D to E, where transition occurs following on-orbit checkout. KDPs associated with uncoupled, loosely coupled, and tightly coupled programs are designated with Roman numerals and zero. The first KDP is KDP 0; the second is KDP I, etc. KDPs for projects and single-project programs are designated with letters, i.e., KDP A, KDP B, etc.

2.2.7.1 For missions selected as a result of an AO, KDP A is the selection of a Step 1 proposal for concept development. In a one-step AO process, projects enter Phase A after selection (KDP A) and the process becomes conventional. In a two-step AO process, projects are down-selected following evaluation of concept study reports and the down-selection serves as KDP B. Following this selection, the process becomes conventional with the exception that products normally required at

KDP B that require Mission Directorate input or approval will be finished as early in Phase B as feasible.

2.2.8 Projects, single-project programs (and other programs at the discretion of the MDAA) with a life-cycle cost (LCC) or initial capability cost (see Section 2.4.1.3.b) estimated to be greater than $250M shall perform earned value management (EVM) and comply with EIA-748, Standard for Earned Value Management Systems for all portions of work including in-house and contracted portions of the project. To ensure that projects meet KDP C requirements, EVM System (EVMS) setup and implementation efforts begin as soon as a project begins to develop the WBS, Organizational Breakdown Structure, and Integrated Master Schedule (IMS). EVM reporting to the performance measurement baseline begins during Phase B and continues as long as EVM applies for the remaining phases.

2.2.8.1 Program and project managers with programs and projects subject to EVM shall utilize the NASA EVM Capability Process for in-house work. NASA's EVM Capability Process can be found on the Program and Project Management Community of Practice at https://nen.nasa.gov/web/evm by selecting "Document Repository" under the "Community Navigation" section. For programs and projects with an LCC or initial capability cost less than $250M, EVM is optional on the in-house work portion, however EVM may be implemented at the discretion of the project manager. An EVMS is not required on non-developmental work, steady state operations, or basic and applied research.

2.2.8.2 EVM system requirements for contracted work shall be applied to suppliers in accordance with the NASA Federal Acquisition Regulation (FAR) Supplement, independent of phase and the $250M threshold (https://www.hq.nasa.gov/office/procurement/regs/NFS.pdf.). For contracts that require EVM, an Integrated Program Management Report (IPMR) and WBS are the Data Requirements Descriptions (DRDs) that are included in the contract and/or agreement.

2.2.8.3 Integrated Baseline Reviews (IBRs) are required whenever EVM is required. Mission Directorates shall conduct an IBR in preparation for KDP C and for major changes that significantly impact the cost and schedule baseline. For contracts, refer to the NASA FAR Supplement for IBR requirements.

2.2.8.4 EVMS surveillance shall be conducted on contracts and on programs and projects with in-house work to ensure continued compliance with EIA-748, Standard for Earned Value Management Systems.

2.2.9 The Office of the Administrator, MDAA, or the Center Director (or designee) may also convene special reviews as they determine the need. In these cases, the MDAA or a Technical Authority forms a special review team composed of relevant members of the SRB and additional outside expert members as needed. The process followed for these reviews is the same as for other reviews. The special review team is dissolved following resolution of the issue(s) that triggered its formation.

2.2.10 Program and project managers shall complete and maintain a Compliance Matrix (see Appendix C) for this NPR and attach it to the Formulation Agreement for projects in Formulation and/or the Program or Project Plan. The program or project will use the Compliance Matrix to demonstrate how it is complying with the applicable program or project requirements of this document.

2.2.11 Single-project programs and projects shall develop a Project Protection Plan that addresses

NASA-STD-1006, Space System Protection Standard in accordance with NPR 1058.1, NASA Enterprise Protection Program. (A copy of the Project Protection Plan Template can be found at https://nen.nasa.gov/web/sap.)

2.3 Program and Project Oversight and Approval

2.3.1 Each program and project shall have a Decision Authority, the Agency's responsible individual who determines whether and how the program or project proceeds through the life cycle and the key program or project cost, schedule, and content parameters that govern the remaining life-cycle activities. For programs and Category 1 projects, the Decision Authority is the NASA AA. The NASA AA may delegate this authority to the MDAA for Category 1 projects. For Category 2 and 3 projects, the Decision Authority is the MDAA. The MDAA may delegate some of their Programmatic Authority to appropriate Mission Directorate staff or to Center Directors. Decision authority may be delegated to a Center Director for determining whether Category 2 and 3 projects may proceed through KDPs into the next phase of the life cycle. However, the MDAA will retain authority for all program-level requirements, funding limits, launch dates, and any external commitments.

2.3.1.1 The MDAA shall inform the NASA AA and Administrator via email on all Agency Baseline Commitments (ABCs) per the following: inform the NASA AA on ABCs for single-project programs and projects with a LCC or initial capability cost (see Section 2.4.1.3.b) greater than $250M; and inform the NASA Administrator on ABCs for all single-project programs and projects with a LCC or initial capability cost greater than $1B and all Category 1 projects. (See Section 2.4.1.5 for more information on ABCs.)

2.3.2 To ensure the appropriate level of management oversight, NASA has established two levels of PMCs—the Agency PMC (APMC) and Mission Directorate PMCs (DPMCs). The PMCs have the responsibility for periodically evaluating the technical, safety, health and medical, and programmatic performance (including cost, schedule, risk, and risk mitigation) and content of a program or project under their purview. These evaluations focus on whether the program or project is meeting its commitments to the Agency. Each program and project shall have a governing PMC. For all programs and Category 1 projects, the governing PMC is the APMC; for Category 2 and 3 projects, the governing PMC is the DPMC. The PMC function may be delegated by the Decision Authority to the Center Management Council (CMC) in the event the Decision Authority is delegated to the Center.

2.3.3 The Decision Authority and governing PMC for the program or project are documented in the applicable authority documents: Program Commitment Agreement (PCA), Formulation Authorization Document (FAD), Formulation Agreement, Program Plan, and Project Plan. Delegations of Decision Authority and delegations of governing PMCs are documented in the applicable authority documents (PCA, Formulation Agreement, Program Plan, Project Plan). Templates for the PCA, FAD, Formulation Agreement, Program Plan, and Project Plan are provided in appendices D, E, F, G, and H, respectively. These templates identify what is documented in each authority document.

2.3.4 The Center Director (or designee) shall oversee programs and projects usually through the CMC, which monitors and evaluates all program and project work (regardless of category) executed at that Center. The CMC evaluation focuses on whether Center engineering, Safety and Mission Assurance (SMA), health and medical, and management best practices (e.g., program and project

management, resource management, procurement, institutional best practices) are being followed by the program or project under review and whether Center resources support program/project requirements. The CMC also assesses program and project risk and evaluates the status and progress of activities to identify and report trends and provide guidance to the Agency and affected programs and projects. The CMC provides its findings and recommendations to program or project managers and to the appropriate PMCs regarding the performance and technical and management viability of the program or project prior to KDPs.

2.3.4.1 For programs and projects that are conducted by multiple Centers, an Integrated Center Management Council (ICMC) should be used where the Center Director (or designee) of each Center with substantial contributions is a member of the ICMC. The ICMC is chaired by the Center Director (or representative) responsible for the program/project management.

2.3.5 Following each LCR, the independent SRB chair and the program or project manager shall brief the applicable management councils on the results of the LCR to support the councils' assessments. The final LCR in a given life-cycle phase provides essential information for the KDP, which marks the end of that life-cycle phase except for transition from Phase D to E, where transition occurs following on-orbit checkout and initial operations. To support the Decision Authority's determination of the readiness of a program or project to progress to the next phase of the life cycle, the program manager (for projects in their program), the Center Director, the MDAA (for programs and Category 1 projects), and the governing PMC provide their assessments and recommendations with supporting data, as necessary. Tables 2-3 through 2-6 define for each LCR and each KDP the LCR objectives and the expected maturity state at the subsequent KDP. (The NASA Space Flight Program and Project Management Handbook provides further details.)

Table 2-3 Expected Maturity State Through the Life Cycle of Uncoupled and Loosely Coupled Programs

KDP Review	Associated Life-cycle Review	LCR Objectives	Overall Expected Maturity State at KDP
KDP 0	SRR	To evaluate whether the program functional and performance requirements are properly formulated and correlated with the Agency and Mission Directorate strategic objectives and assess the credibility of the program's estimated budget and schedule.	Program addresses critical NASA needs and can likely be achieved as conceived.
KDP I	SDR	To evaluate the proposed program requirements/ architecture and allocation of requirements to initial projects, assess the adequacy of project pre-Formulation efforts, and	Program is in place and stable, addresses critical NASA needs, has adequately completed Formulation activities, has an acceptable plan for Implementation that leads to mission success, has proposed

		determine whether the maturity of the program's definition and associated plans are sufficient to begin implementation.	mission success, has proposed projects that are feasible within available resources, and has risks that are commensurate with the Agency's expectations.
KDP II to KDP n	PIR	To evaluate the program's continuing relevance to the Agency's Strategic Plan, assess performance with respect to expectations, and determine the program's ability to execute the implementation plan with acceptable risk within cost and schedule constraints.	Program still meets Agency needs and is continuing to meet Agency commitments, as planned.

NOTE: LCR entrance and success criteria in NPR 7123.1 and the life-cycle phase and KDP information in the NASA Space Flight Program and Project Management Handbook provide specifics for addressing the six criteria required to demonstrate the program or project has met expected maturity state.

Table 2-4 Expected Maturity State Through the Life Cycle of Tightly Coupled Programs

KDP Review	Associated Life-cycle Review	LCR Objectives	Overall Expected Maturity State at KDP
KDP 0	SRR	To evaluate whether the functional and performance requirements defined for the system are responsive to the Mission Directorate requirements on the program and its projects and represent achievable capabilities.	Program addresses critical NASA needs, and projects are feasible within available resources.
	SDR	To evaluate the credibility and responsiveness of the proposed program requirements/architecture to the Mission Directorate requirements and constraints, including available resources, and allocation of requirements to projects. To determine whether the maturity of the program's mission/system definition and associated plans are sufficient to begin preliminary	

		sufficient to begin preliminary design.	
KDP I	PDR	To evaluate the completeness/consistency of the program's preliminary design, including its projects, in meeting all requirements with appropriate margins, acceptable risk, and within cost and schedule constraints, and to determine the program's readiness to proceed with the detailed design phase of the program.	Program is in place and stable, addresses critical NASA needs, has adequately completed Formulation activities, and has an acceptable plan for Implementation that leads to mission success. Proposed projects are feasible with acceptable risk within Agency cost and schedule baselines.
KDP II	CDR	To evaluate the integrity of the program integrated design, including its projects and ground systems. To meet mission requirements with appropriate margins and acceptable risk within cost and schedule constraints. To determine if the integrated design is appropriately mature to continue with the final design and fabrication phase.	Program is still on plan. The risk is commensurate with the projects' payload classifications. The program is ready for Assembly, Integration, and Test (AI&T) with acceptable risk within Agency cost and schedule baselines.
	SIR	To evaluate the readiness of the program, including its projects and supporting infrastructure, to begin system AI&T with acceptable risk and within cost and schedule constraints.	
KDP III	ORR	To evaluate the readiness of the program, including its projects, ground systems, personnel, procedures, and user documentation. To operate the flight system and associated ground systems in compliance with program requirements and constraints during the operations phase.	Program is ready for launch and early operations with acceptable risk within Agency cost and schedule baselines.

	FRR or MRR	To evaluate the readiness of the program and its projects, ground systems, personnel, and procedures for a safe and successful launch and flight/mission.	
Non-KDP Mission Operations Reviews	PLAR	To evaluate the in-flight performance of the program and its projects. To determine the program's readiness to begin the operations phase of the life cycle and transfer responsibility to the operations organization.	PLAR Expected State: Project is ready to conduct mission operations with acceptable risk within Agency cost and schedule baselines.
	CERR	To evaluate the readiness of the program and its projects to execute a critical event during the flight operations phase of the life cycle.	Mission CERR Expected State: Project is ready to conduct critical mission activity with acceptable risk.
	PFAR	To evaluate how well mission objectives were met during a human space flight mission. To evaluate the status of the flight and ground systems, including the identification of any anomalies and their resolution.	PFAR Expected State: All anomalies that occurred in flight are identified, and actions necessary to mitigate or resolve these anomalies are in place.
KDP IV to KDP n-1	PIR	To evaluate the program's continuing relevance to the Agency's Strategic Plan, assess performance with respect to expectations, and determine the program's ability to execute the implementation plan with acceptable risk within cost and schedule constraints.	Program still meets Agency needs and is continuing to meet Agency commitments as planned.
KDP n	DR	To evaluate the readiness of the program and its projects to conduct closeout activities, including final delivery of all remaining program/project deliverables and safe decommissioning/disposal of space flight systems and other program/project assets.	Program decommissioning is consistent with program objectives and is ready for final analysis and archival of mission and science data and safe disposal of its assets.

CERR Critical Events Readiness Review PLAR Post-Launch Assessment Review

FRR	Flight Readiness Review	PFAR	Post-Flight Assessment Review
MRR	Mission Readiness Review	DR	Decommissioning Review

NOTE: LCR entrance and success criteria in NPR 7123.1 and the life-cycle phase and KDP information in the NASA Space Flight Program and Project Management Handbook provide specifics for addressing the six criteria required to demonstrate the program or project has met expected maturity state.

Table 2-5 Expected Maturity State Through the Life Cycle of Projects and Single-Project Programs

KDP Review	Associated Life-cycle Review	LCR Objectives	Overall Expected Maturity State at KDP
KDP A	MCR	To evaluate the feasibility of the proposed mission concept(s) and its fulfillment of the program's needs and objectives. To determine whether the maturity of the concept and associated planning are sufficient to begin Phase A.	Project addresses critical NASA need. Proposed mission concept(s) is feasible. Associated planning is sufficiently mature to begin Phase A, and the mission can likely be achieved as conceived.
KDP B	SRR	To evaluate whether the functional and performance requirements defined for the system are responsive to the program's requirements on the project and represent achievable capabilities.	Proposed mission/system architecture is credible and responsive to program requirements and constraints, including resources. The maturity of the project's mission/system definition and associated plans is sufficient to begin Phase B, and the mission can likely be achieved within available resources with acceptable risk.
	MDR or SDR	To evaluate the credibility and responsiveness of the proposed mission/system architecture to the program requirements and constraints, including available resources. To determine whether the maturity of the project's mission/system definition and associated plans are sufficient to begin Phase B.	

KDP C	PDR	To evaluate the completeness/consistency of the planning, technical, cost, and schedule baselines developed during Formulation. To assess compliance of the preliminary design with applicable requirements and to determine if the project is sufficiently mature to begin Phase C.	Project's planning, technical, cost, and schedule baselines developed during Formulation are complete and consistent. The preliminary design complies with its requirements. The project is sufficiently mature to begin Phase C, and the cost and schedule are adequate to enable mission success with acceptable risk.
KDP D	CDR	To evaluate the integrity of the project design and its ability to meet mission requirements with appropriate margins and acceptable risk within defined project constraints, including available resources. To determine if the design is appropriately mature to continue with the final design and fabrication phase.	Project is still on plan. The risk is commensurate with the project's payload classification, and the project is ready for AI&T with acceptable risk within its ABC.
	PRR	To evaluate the readiness of system developer(s) to produce the required number of systems within defined project constraints for projects developing multiple similar flight or ground support systems. To evaluate the degree to which the production plans meet the system's operational support requirements.	
	SIR	To evaluate the readiness of the project and associated supporting infrastructure to begin system AI&T, evaluate whether the remaining project development can be completed within available resources, and determine if the project is sufficiently mature to begin Phase D.	

KDP E	ORR	To evaluate the readiness of the project to operate the flight system and associated ground system(s) in compliance with defined project requirements and constraints during the operations/sustainment phase of the project life cycle.	Project and all supporting systems are ready for safe, successful launch and early operations with acceptable risk within ABC.
	MRR or FRR	To evaluate the readiness of the project and all project and supporting systems for a safe and successful launch and flight/mission.	
KDP En (applies only to Single-Project Programs)	PIR	To evaluate the program's continuing relevance to the Agency's Strategic Plan, assess performance with respect to expectations, and determine the program's ability to execute the implementation plan with acceptable risk within cost and schedule constraints.	Program still meets Agency needs and is continuing to meet Agency commitments, as planned.
Non-KDP Reviews	PLAR	To evaluate in-flight performance of the flight system early in the mission and determine whether the project is sufficiently prepared to begin Phase E.	PLAR Expected State: Project is ready to conduct mission operations with acceptable risk within ABC.
	CERR	To evaluate the readiness of the project and the flight system for execution of a critical event during the flight operations phase of the life cycle.	Mission CERR Expected State: Project is ready to conduct critical mission activity with acceptable risk.
	PFAR	To evaluate how well mission objectives were met during a human space flight mission and to evaluate the status of the returned vehicle.	PFAR Expected State: All anomalies that occurred in flight are identified. Actions necessary to mitigate or resolve these anomalies are in place.
		To evaluate the readiness of the project to conduct closeout activities including final delivery of all remaining project deliverables	Project decommissioning is consistent with program objectives and project is ready for safe decommissioning of its

KDP F	DR	and safe decommissioning of space flight systems and other project assets. To determine if the project is appropriately prepared to begin Phase F.	decommissioning of its assets and closeout of activities, including final delivery of all remaining project deliverables and disposal of its assets.
Non-KDP Disposal Readiness Review	DRR	To evaluate the readiness of the project and the flight system for execution of the spacecraft disposal event.	Mission DRR Expected State: Project ready to conduct disposal activity with acceptable risk.
MCR Mission Concept Review			
PRR Production Readiness Review			
DRR Disposal Readiness Review			

NOTE: LCR entrance and success criteria in NPR 7123.1 and the life-cycle phase and KDP information in the NASA Space Flight Program and Project Management Handbook provide specifics for addressing the six criteria required to demonstrate the program or project has met expected maturity state.

Table 2-6 Objectives for Other Reviews

Review Name	Review Objective
System Acceptance Review (SAR)	To evaluate whether a specific end item is sufficiently mature to be shipped from the supplier to its designated operational facility or launch site.
Safety and Mission Success Review (SMSR)	To prepare Agency safety, engineering, and health and medical management to participate in program final readiness reviews preceding flights or launches, including experimental/test launch vehicles or other reviews as determined by the Chief, Safety and Mission Assurance. The SMSR provides the knowledge, visibility, and understanding necessary for senior safety, engineering, and health and medical management to either concur or nonconcur in program decisions to proceed with a launch or significant flight activity.
Launch Readiness Review (LRR)	To evaluate a program/project and its ground, hardware, and software systems for readiness for launch.

2.4 Approving and Maintaining Program and Project Plans, Baselines, and Commitments

2.4.1 After reviewing the supporting material and completing discussions with concerned parties, the Decision Authority determines whether and how the program or project proceeds into the next phase and approves any additional actions. The decisions by the Decision Authority on whether and how the program or project proceeds into the next phase shall be summarized and recorded in the Decision Memorandum signed at the conclusion of the governing PMC by all parties with supporting responsibilities, accepting their respective roles. Once signed, the Decision Memorandum is appended to the project Formulation Agreement, Program Plan, or Project Plan, as appropriate. (Decision Memorandum templates may be found at https://community.max.gov/pages/viewpage.action?pageId=1232962906. Additional information on the Decision Memorandum is provided in the NASA Space Flight Program and Project Management Handbook, Section 5.5.6.)

2.4.1.1 The Decision Memorandum shall describe the constraints and parameters within which the Agency, the program manager, and the project manager will operate; the extent to which changes in plans may be made without additional approval; any additional actions that came out of the KDP; and the supporting data (e.g., the cost and schedule data sheet) that provide further details. The NASA Space Flight Program and Project Management Handbook provides an example of the Decision Memorandum to illustrate the level and types of information that are documented.

2.4.1.2 The Management Agreement contained within the Decision Memorandum defines the parameters and authorities over which the program or project manager has management control. A program or project manager has the authority to manage within the Management Agreement and is accountable for compliance with the terms of the agreement. The Management Agreement, which is documented at every KDP, may be changed between KDPs as the program or project matures and in response to internal and external events. The Management Agreement should be viewed as a contract between the Agency and the program or project manager. A divergence from the Management Agreement that any signatory identifies as significant shall be accompanied by an amendment to the Decision Memorandum.

2.4.1.3 During Formulation, the Decision Memorandum shall establish a target LCC or initial capability cost range (and schedule range, if applicable) as well as the Management Agreement addressing the schedule and resources required to complete Formulation.

a. For single-project programs and projects with a LCC or initial capability cost greater than or equal to $1B, the Decision Memorandum shall establish a high and low value for cost and schedule with the corresponding JCL value at KDP B. (See Section 2.4.3.1.) (This requirement does not apply to two-step AO missions.)

b. Single-project programs and projects that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point, (e.g., SLS, EGS, Orion) define the scope of an initial capability in the KDP B Decision Memorandum and establish an initial capability cost.

2.4.1.4 The Decision Memorandum also documents any additional resources beyond those explicitly estimated or requested by the program/project (e.g., additional schedule margin) when the Decision Authority determines that this is appropriate. This includes Unallocated Future Expenses (UFE), which are costs that are expected to be incurred but cannot yet be allocated to a specific WBS sub-element of a program's or project's plan. Management control of some UFE may be retained above the level of the project (i.e., Agency, Mission Directorate, or program). (See Figure 2-6, Example of Agreements and Commitments in Terms of Cost for Projects.)

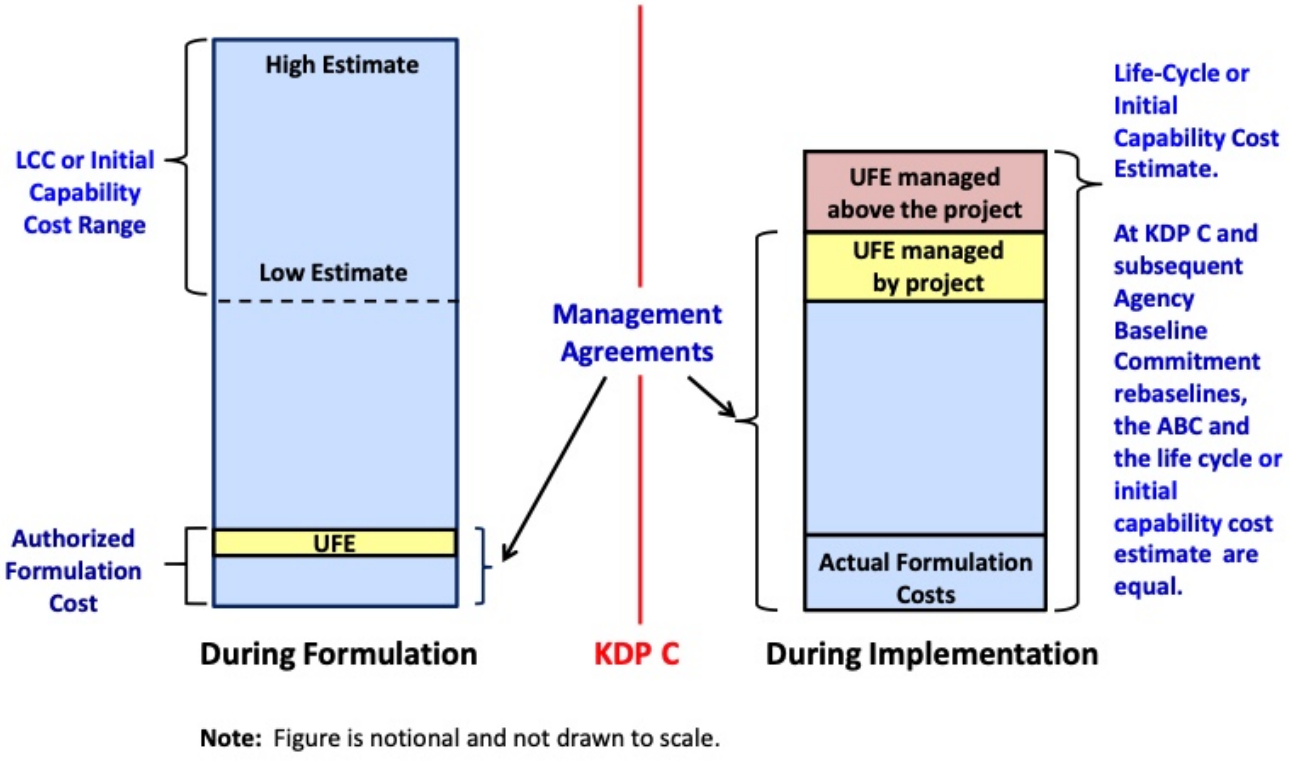

Figure 2 6 Example of Agreements and Commitments in Terms of Cost for Projects

2.4.1.5 All single-project program managers and project managers shall document the Agency's LCC estimate or initial capability cost estimate and other parameters in the Decision Memorandum for Implementation (KDP C), and this becomes the ABC. The ABC is the baseline against which the Agency's performance is measured during the Implementation Phase. The ABC for programs and projects with a LCC of $250M or more forms the basis for the Agency's external commitment to OMB and Congress.

a. For all single-project programs and projects with a definite Phase E end point, the Agency's LCC estimate and other parameters shall become the ABC.

b. For single-project programs and projects that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point, the initial capability cost estimate and other parameters shall become the ABC.

2.4.1.6 For single-project programs and projects that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point, the Phase E cost estimate for the continuing operations and production phase is established as part of the ORR and KDP E for the five years after initial capability and subsequently updated and documented annually for the next 5-year period. Upgrades during Phase E meeting the Agency criteria for a major project for external reporting will be treated as projects for the purposes of their own ABC outside the Phase E cost estimate. Other upgrades will be reflected in the Phase E cost estimate.

2.4.1.7 Tightly coupled programs shall document their LCC estimate in accordance with the life-cycle scope defined in the FAD or PCA, and other parameters in their Decision Memorandum at KDP I and update it at subsequent KDPs.

2.4.1.8 Programs or projects shall be rebaselined when: (1) the estimated development cost [7] exceeds

the ABC development cost by 30 percent or more (for projects over $250M, also that Congress has reauthorized the project); (2) the NASA AA judges that events external to the Agency make a rebaseline appropriate; or (3) the NASA AA judges that the program or project scope defined in the ABC has been changed or the project has been interrupted. ABCs for projects are not rebaselined to reflect cost or schedule growth that does not meet one or more of these criteria. When an ABC is rebaselined, the Decision Authority directs that a review of the new baseline be conducted by the SRB or as determined by the Decision Authority.

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[7]Â â??Development costâ? includes all project costs from authorization to proceed to Implementation (Phase C) through operational readiness at the end of Phase D.

2.4.2 All programs and projects develop cost estimates and planned schedules for the work to be performed in the current and following life-cycle phases (see Appendix I tables). The program or project shall document the basis of estimate (BOE) for cost estimates and planned schedules in retrievable program or project records.

2.4.3 Single-project programs (regardless of LCC or initial capability cost) and projects with an estimated LCC or initial capability cost greater than $250M develop probabilistic analyses of cost and schedule estimates to obtain a quantitative measure of the likelihood that the estimate will be met in accordance with the following requirements. (In this section, for programs and projects that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point, the initial capability cost is used instead of LCC.)

2.4.3.1 At KDP B:

a. Single-project programs with an estimated LCC under $1B and projects with an estimated LCC greater than $250M and under $1B shall provide a range of cost and a range for schedule, each range (with confidence levels identified for the low and high values of the range) established by a probabilistic analysis and based on identified resources and associated uncertainties by fiscal year. Separate analyses of cost and schedule, each with associated confidence levels, meet the requirement. A joint cost and schedule confidence level (JCL) is not required but may be used.

b. Single-project programs and projects with an estimated LCC greater than or equal to $1B shall develop a JCL and provide a high and low value for cost and schedule with the corresponding JCL value (e.g., 50 percent, 70 percent).[8] The JCL is informed by a probabilistic analysis of development cost and schedule duration.[9] The JCL measures the likelihood of completing all remaining work at or below the budgeted levels and on or before the planned completion of Phase D.

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[8]Â This requirement is not applicable to two-step Announcement of Opportunity missions due to acquisition down-selection serving as KDP B (Section 2.2.7.1).

[9]Â The methodology for JCL analysis at KDP B is not limited to a probabilistic analysis of the coupled cost and schedule specified for KDP C (see Section 2.4.3.2). Other parametric and bivariate methodologies may be applied.

2.4.3.2 At KDP C, single-project programs (regardless of LCC) and projects with an estimated LCC greater than $250M shall develop a cost-loaded schedule and perform a risk-informed probabilistic analysis that produces a JCL. The JCL at KDP C is the product of a probabilistic analysis of the coupled cost and schedule.

2.4.3.3 At CDR, single-project programs and projects with an estimated LCC greater than or equal to $1B shall update their KDP C JCL and communicate the updated JCL values for the ABC and Management Agreement to the APMC for informational purposes.

2.4.3.4 At KDP D, single-project programs and projects with an estimated LCC greater than or equal to $1B shall update their JCL if current reported development costs have exceeded the development ABC cost by 5 percent or more and document the updated JCL values for the ABC and Management Agreement in the KDP D Decision Memorandum.

2.4.3.5 When a single-project program (regardless of LCC) or project with an estimated LCC greater than $250M is rebaselined, a JCL shall be calculated and evaluated as a part of the rebaselining approval process.

2.4.4 Mission Directorates plan, budget, and ensure funding for single-project programs (regardless of LCC or initial capability cost) and projects with an estimated LCC or initial capability cost greater than $250M in accordance with the following requirements. (In this section, for programs and projects that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point, the initial capability cost is used instead of LCC.)

2.4.4.1 At KDP B, Mission Directorates shall plan and budget single-project programs and projects with an estimated LCC greater than or equal to $1B based on a 70 percent JCL or as approved by the Decision Authority.

2.4.4.2 At KDP C, Mission Directorates shall plan and budget single-project programs (regardless of LCC) and projects with an estimated LCC greater than

$250M based on a 70 percent JCL or as approved by the Decision Authority.

2.4.4.3 At KDP B and KDP C, any JCL approved by the Decision Authority at less than 70 percent shall be justified and documented in a Decision Memorandum.

2.4.4.4 At KDP C, Mission Directorates shall ensure funding for single-project programs (regardless of LCC) and projects with an estimated LCC greater than $250M is consistent with the Management Agreement and in no case less than the equivalent of a 50 percent JCL or as approved by the Decision Authority.

2.4.4.5 At KDP C, any funding approved by the Decision Authority that is inconsistent with the Management Agreement or less than 50 percent JCL shall be justified and documented in a Decision Memorandum.

2.4.5 Tightly coupled, loosely coupled, and uncoupled programs are not required to develop program cost and schedule confidence levels. Tightly coupled, loosely coupled, and uncoupled programs shall provide analysis of the program’s risk posture to the governing PMC as each new project reaches KDP B and C or when a project’s ABC is rebaselined.

Chapter 3. Program and Project Management Roles and Responsibilities

3.1 Governance

3.1.1 The fundamental principles of NASA governance are defined in NPD 1000.0, NASA Governance and Strategic Management Handbook. The governance model prescribes a management structure that employs checks and balances among key organizations to ensure that decisions have the benefit of different points of view and are not made in isolation. This structure is made up of two authorities: Programmatic and Institutional. Programmatic Authority consists of the Mission Directorates and their respective programs and projects. The Institutional Authority consists of those organizations not in the Programmatic Authority. As part of Institutional Authority, NASA established the Technical Authority (TA) process as a system of checks and balances to provide independent oversight of programs and projects in support of safety and mission success through the selection of specific individuals with delegated levels of authority. Individuals with these formal delegations are Technical Authorities. The requirements related to TA are contained in Section 3.3.

3.2 Roles and Responsibilities

3.2.1 The roles and responsibilities of NASA management are defined in NPD 1000.0, NASA Governance and Strategic Management Handbook and further outlined in NPD 1000.3, The NASA Organization. The key roles and responsibilities specific to programs and projects can be summarized as follows:

a. The Administrator leads the Agency and is accountable to the President for all aspects of the Agency’s mission, including establishing and articulating the Agency’s vision and strategic priorities and ensuring successful implementation of supporting policies, programs, and performance assessments. The Administrator performs all necessary functions to govern NASA operations and exercises the powers vested in NASA by law.

b. The NASA Associate Administrator is responsible for the technical and programmatic integration of programs at the Agency level and serves as the Decision Authority for programs and Category 1 projects with the advice of the APMC. He or she monitors the status and performance of the programs and projects via reports from the MDAA; Center Director; and through Agency-level review, such as the APMC and the Baseline Performance Review (BPR) process. The NASA AA may delegate Decision Authority to MDAAs. Within the Office of the NASA AA, the NASA Program Management Improvement Officer (PMIO) is responsible for leading the Agency-level program/project management integration function with support from OCE and OCFO and in partnership with the Mission Directorates and Centers. [10]

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[10] For additional information on the roles and responsibilities of the NASA PMIO, see the NASA Program Management Improvement and Accountability Act (PMIAA) Implementation Plan, and AA Memo "Dr. James Ortiz to Lead Program Management Integration Function," March 7, 2019. Both documents can be found in NODIS on the OCE tab under the "Other NASA-Level Documents" menu.

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c. MDAAs are responsible for Programmatic Authority in managing programs and projects within their Mission Directorate. They establish directorate policies applicable to programs, projects, and supporting elements; support the Agency's strategic acquisition process; initiate new programs and projects; recommend assignment of programs and Category 1 projects to Centers; assign Category 2 and 3 projects to Centers; serve as the KDP Decision Authority for Category 2 and 3 projects; are responsible for all program-level requirements; establish program and project budgets; approve Formulation Agreements and Program and Project Plans; oversee program and project performance via the DPMC; report on program and project progress including deviations in performance (e.g., cost, schedule, technical, and risk) that could impact Agency commitments and performance goals with external organizations and stakeholders to Agency forums; and approve launch readiness. The MDAAs may delegate some of their Programmatic Authority to deputy associate administrators, division directors, or their equivalent, such as program managers, and Center Directors. The MDAAs also plan and manage independent reviews with support from Centers for the Mission Directorate program and project portfolio; organize and staff the independent review teams; ensure reviews are conducted in accordance with documented review expectations (e.g., Terms of Reference (ToR)); monitor execution of the reviews; and capture lessons learned with support from Centers, the OCFO, Office of the General Counsel (OGC), Office of Safety and Mission Assurance (OSMA), OCHMO, and OCE. The MDAAs proactively work with Center Directors to develop constructive solutions for the formulation and implementation of programs and projects conducted at their Centers and to resolve issues as they arise.

d. Center Directors are responsible and accountable for all activities assigned to their Center. They are responsible for the institutional activities and for ensuring the proper planning for and successful execution of programs and projects assigned to the Center. This includes:

(1) Performing their delegated Technical Authority duties in accordance with Section 3.3;

(2) Ensuring the Center is capable of accomplishing the programs, projects, and other activities assigned to it in accordance with Agency policy and the Center's best practices and institutional policies by establishing, developing, and maintaining institutional capabilities (processes and procedures, human capital—including trained/certified program/project personnel, facilities, and infrastructure) required for the execution of programs and projects;

(3) Allocating resources to support program and project requirements and schedules, including project management, engineering, and safety and mission assurance;

(4) Establishing and maintaining on-going processes and forums, including the CMC, to monitor the status and progress of programs and projects at their Center;

(5) Performing periodic program and project reviews, as well as special reviews, to assess technical and programmatic progress to ensure performance in accordance with their Center's and the Agency's requirements, procedures, processes, etc.;

(6) Reporting the executability of all aspects of their programs and projects (programmatic, technical, and all others) along with major risks, mitigation strategies, and significant concerns to the Decision Authority and other appropriate forums, including Agency and Mission Directorate Program Management Councils;

(7) Working with the Mission Directorate and the programs and project managers, once assigned, to assemble the program/project team(s) and to provide needed Center resources;

(8) Providing support and guidance to programs and projects in resolving technical and

programmatic issues and risks;

(9) Concurring on the adequacy of cost/schedule estimates and the consistency of these estimates with Agency requirements, workforce, and other resources stipulated in proposed Program and Project Plans;

(10) Working proactively with the Mission Directorates, programs, projects, and other Institutional Authorities to find constructive solutions to problems to benefit both the programs and projects and the overall Agency long-term health;

(11) Certifying that programs and/or projects have been accomplished properly as part of the launch approval process; and

(12) Supporting Mission Directorates to plan and manage independent reviews.

e. The program manager is responsible for the formulation and implementation of the program in accordance with this document. This includes responsibility and accountability for the program safety; technical integrity; technical, cost, and schedule performance; and mission success. (Refer to the NASA Space Flight Program and Project Management Handbook and NASA/SP-2016-3424, NASA Project Planning and Control Handbook for additional information.)

f. The project manager is responsible for the formulation and implementation of the project in accordance with this document. This includes responsibility and accountability for the project safety; technical integrity; technical, cost, and schedule performance; and mission success. (Refer to the NASA Space Flight Program and Project Management Handbook and the NASA Project Planning and Control Handbook for additional information.)

g. The Chief Financial Officer (CFO) oversees all financial management, budget, strategic planning, and performance activities relating to the programs and operations of the Agency. The Office of the Chief Financial Officer (OCFO) provides Agency programmatic (cost and schedule) analysis capability leadership; establishes cost and schedule analyses policies, methods, and standards; and assists in identification of personnel with analytical expertise to support in-line programmatic activities of NASA programs and projects, as well as independent programmatic assessments (e.g., SRB).

h. The NASA Chief Engineer establishes policy, oversight, and assessment of the NASA engineering and program/project management processes; implements the Engineering Technical Authority process; and serves as principal advisor to the Administrator and other senior officials on matters pertaining to the technical capability and readiness of NASA programs and projects to execute according to plans. The Chief Engineer directs the NASA Engineering and Safety Center (NESC) and ensures that programs/projects respond to requests from the NESC for data and information needed to make independent technical assessments and then respond to NESC assessments. The Chief Engineer leads the mission and program/project performance assessment for the BPR; ensures that mission resiliency and protection functional support is provided to NASA missions and management, including development and review of project protection plans; and co-chairs the Safety and Mission Success Review (SMSR) with the Office of Safety and Mission Assurance (OSMA) and the Office of the Chief Health and Medical Officer (OCHMO).

i. The Chief, Safety and Mission Assurance (SMA) ensures the existence of robust safety and mission assurance processes and activities through the development, implementation, assessment, and functional oversight of Agency-wide safety, reliability, maintainability, quality, and risk management policies and procedures. The Chief, SMA serves as principal advisor to the

Administrator and other senior officials on Agency-wide safety, reliability, maintainability, and quality; performs independent program and project compliance verification audits and assessments of safety and mission success practice; implements the SMA Technical Authority process; monitors, collects, and assesses Agency-wide safety and mission assurance financial and performance results; oversees the prompt investigation of NASA mishaps and ensures the appropriate closure; and co-chairs the SMSR with the OCE and OCHMO.

j. The NASA Chief Health and Medical Officer (CHMO) is the focal point for policy formulation, oversight, coordination, and management of all NASA health and medical matters in all environments, and medical emergency preparedness, contingency operations, and response; The CHMO implements the Health and Medical Technical Authority (HMTA) process for all health and medical requirements and matters and is the principal advisor to the Administrator and other senior officials on matters pertaining to human health in all Agency programs and projects. The CHMO is responsible for Agency-level health and medical standards and policies; independently reviews all programs and projects to ensure compliance with all health, medical, and human performance policy, requirements, and standards; and co-chairs the SMSR with the OCE and OSMA.

k. The Chief Information Officer (CIO) is the principal Agency advisor to the Administrator and other senior officials on matters pertaining to IT, the NASA Enterprise Architecture (EA), cybersecurity, records management, and privacy. The CIO develops, maintains, and facilitates implementation of the NASA EA, which is the framework for ensuring that IT investments and plans enable the mission and are integrated, efficient, and secure. The CIO also leads and implements NASA’s Cybersecurity Program, ensuring appropriate confidentiality, integrity, and availability of all NASA's information assets throughout the system life cycle. The CIO exercises Mission Support Authority for IT and signs the Authority to Operate IT systems (e.g., corporate, mission, ground, air, and space). This authorization is the official management decision given by a senior organizational official to authorize operation of an information system and to explicitly accept the risk to organizational operations (including mission, functions, image, or reputation), organizational assets, individuals, other organizations, and the Nation based on implementing an agreed-upon set of security controls.

l. The Mission Support Directorate (MSD) Associate Administrator establishes policy and procedures for institutional oversight for mission support functional areas (e.g., procurement).

m. Roles and responsibilities for other NASA organizations can be found in NPD 1000.3.

3.3 Technical Authority

3.3.1 Programs and projects shall follow the Technical Authority (TA) process established in this Section 3.3. NASA established this process as part of its system of checks and balances to provide independent oversight of programs and projects in support of safety and mission success through the selection of specific individuals with delegated levels of authority. These individuals are the Technical Authorities (TAs). In this document, the term TA is used to refer to such an individual but is also used to refer to elements of the TA process. The responsibilities of a program or project manager are not diminished by the implementation of TA. The program or project manager is ultimately responsible for the safe conduct and successful outcome of the program or project in conformance with governing requirements. This includes meeting programmatic, institutional, technical, safety, cost, and schedule commitments. Further detail on TA is provided in NASA/SP-2014-3705, NASA Space Flight Program and Project Management Handbook.

3.3.2 TA originates with the Administrator and is formally delegated to the NASA AA and then to the NASA Chief Engineer for Engineering TA; the Chief, Safety and Mission Assurance for SMA TA; and then to the Center Directors. The Administrator delegates Health and Medical Technical Authority (HMTA) to the NASA CHMO. Subsequent TA delegations are made to selected individuals who are funded independent of the Programmatic Authority. Such delegations are formal and traceable to the Administrator. TAs located at Centers remain part of their Center organization, and their personnel performance appraisal is signed by the management of that Center organization. The Center Director (or designee) is responsible for establishing and maintaining Center TA policies and practices, consistent with Agency policies and standards.

3.3.3 Other Technical Authority Roles

3.3.3.1 Top-level documents developed by a program detailing Agency-level requirements for human-rated systems are signed by the Administrator or his/her formally delegated designee.

3.3.3.2 On decisions related to technical and operational matters involving safety and mission success residual risk, formal concurrence by the responsible TAs (Engineering, Safety and Mission Assurance, and/or Health and Medical) is required. This concurrence is to be based on the technical merits of the case. For residual risks to personnel or high-value hardware, the cognizant safety organization needs to agree that the risk is acceptable. For matters involving human safety risk, the actual risk taker(s) (or official spokesperson(s) and their supervisory chain) need to formally consent to taking the risk and the responsible program, project, or operations manager needs to formally accept the risk.

3.3.4 At the program or project level, the responsibilities common to each of the individuals with delegated TA (ETA, SMA TA, and HMTA) are delineated below. (See Sections 3.3.7 to 3.3.10 for unique aspects of each of the TAs.) These individuals:

a. Serve as members of program or project control boards, change boards, and internal review boards.

b. Work with the Center management and other TA personnel, as necessary, to ensure that the quality and integrity of program or project processes, products, and standards of performance related to engineering, SMA, and health and medical reflect the level of excellence expected by the Center or, where appropriate, by the NASA TA community.

c. Ensure that requests for waivers or deviations from TA requirements are submitted to and acted on by the appropriate level of TA. (“Technical Authority requirements” is defined in Appendix A.)

d. Assist the program or project in making risk-informed decisions that properly balance technical merit, cost, schedule, and safety across the system.

e. Provide the program or project with the TA view of matters based on their knowledge and experience and raise a Formal Dissent (see Section 3.4) on a decision or action, when appropriate.

f. Serve as an effective part of NASA’s overall system of checks and balances.

3.3.5 The day-to-day involvement of the TAs in program or project activities ensures that significant views from the TAs will be available to the program or project in a timely manner and should be handled during the normal program/project processes. TAs are expected to keep their discipline chain of authority informed of issues as they arise, including direct communication between the Center’s engineering director, SMA director (or equivalent), and lead HMTA Integration Centers

with their counterparts at NASA HQ.

3.3.6 Infrequent circumstances may arise when a TA and the program or project manager disagree on a proposed programmatic or technical action and judge that the issue rises to a level of significance that should be brought to the attention of the next higher level of management (i.e., a Formal Dissent exists). In such circumstances:

a. Resolution occurs prior to Implementation whenever possible. However, if considered to be in the best interest of the program/project, the program/project manager has the authority to proceed at risk in parallel with the pursuit of a resolution. In such circumstances, the next higher level of Programmatic and TA is informed of the decision to proceed at risk.

b. Resolution is jointly attempted at successively higher levels of Programmatic Authority and TA until resolved. Final appeals are made to the NASA Administrator.

3.3.7 The **Engineering Technical Authority (ETA)** establishes and is responsible for the engineering design processes, specifications, rules, best practices, etc., necessary to fulfill programmatic mission performance requirements.

3.3.7.1 The NASA Chief Engineer provides overall leadership for the ETA process for programs and projects, including Agency engineering policy direction, requirements, and standards. The NASA Chief Engineer approves the appointment of the Center engineering directors (or equivalent) and of ETAs on programs and Category 1 projects and is notified of the appointment of other Engineering TAs. The NASA Chief Engineer hears appeals of engineering decisions when they cannot be resolved at lower levels.

3.3.7.2 The Center Director (or designee) develops the Center's ETA policies and practices, consistent with Agency policies and standards. The following individuals are responsible for implementing ETA at the Center:

a. Center Director—The Center Director (or the Center Engineering Director or designee) is the Center ETA responsible for Center engineering design processes, specifications, rules, best practices, etc., necessary to fulfill mission performance requirements for programs, projects, and/or major systems implemented by the Center. The Center Director delegates Center ETA implementation responsibility to an individual in the Center's engineering leadership. The Center ETA supports the TAs in processing changes to, and waivers or deviations from, requirements that are the responsibility of the ETA. This includes all applicable Agency and Center engineering directives, requirements, procedures, and standards. The Center Director appoints, with the approval of the NASA Chief Engineer, individuals for the position of Center engineering director (or equivalent) and for the ETA positions down to and including program chief engineers and Category 1 project chief engineers (or equivalents).[11] The Center Director or designee appoints Category 2 and 3 project chief engineers and lead discipline engineers.

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[11] Centers may use an equivalent term for these positions, such as program/project systems engineer.

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b. Program/Project Chief Engineer (PCE)—The PCE is the position to which the program/project-level ETA has been delegated. Different Centers use different titles for this position.

c. Lead Discipline Engineer (LDE)—The LDE is a senior technical engineer in a specific discipline at the Center. Different Centers use different titles for this position. The LDE assists the

program/project through direct involvement with working-level engineers to identify engineering requirements in accordance with NPR 7120.10, Technical Standards for NASA Programs and Projects and other documents and to develop solutions that comply with the requirements. The LDE works through and with the PCE to ensure the proper application and management of discipline-specific engineering requirements and Agency standards.

3.3.7.3 The ETA for the program or project leads and manages the engineering activities, including systems engineering, design, development, sustaining engineering, and operations. A Center may have more than one engineering organization and delegates ETA to different areas as needed. To support the program/project and maintain ETA independence and an effective check and balance system:

a. The program/project manager concurs in the appointment of the program/project-level ETAs.

b. The ETA cannot approve a request for relief from a non-technical derived requirement established by a Programmatic Authority.

c. An ETA may approve a request for relief from a technical derived requirement if he/she ensures that the appropriate independent Institutional Authority subject matter expert who is the steward for the involved technology has concurred in the decision to approve the requirement relief.

3.3.8 Although a limited number of individuals make up the ETAs, their work is enabled by the contributions of the program's or project's working-level engineers and other supporting personnel (e.g., contracting officers). The working-level engineers do not have formally delegated TA and consequently may not serve in an ETA capacity. These engineers perform the detailed engineering and analysis for the program/project with guidance from their Center management and/or LDEs and support from the Center engineering infrastructure. They deliver the program/project products (e.g., hardware, software, designs, analysis, and technical alternatives) that conform to applicable programmatic, Agency, and Center requirements. They are responsible for raising issues to the program/project manager, Center engineering management, and/or the PCE, as appropriate, and are a key resource for resolving these issues.

3.3.9 The **Safety and Mission Assurance (SMA) TA** establishes and is responsible for the SMA processes, specifications, rules, best practices, etc., necessary to fulfill safety and programmatic mission performance requirements. (Refer to NPR 8715.3, NASA General Safety Program Requirements.) The following individuals are responsible for implementing SMA TA at the Center:

3.3.9.1 The Chief, SMA—The Chief, SMA hears appeals of SMA decisions when issues cannot be resolved below the Agency level.

3.3.9.2 Center Director—The Center Director (or the Center safety and mission assurance director or designee) is the Center SMA TA responsible for Center safety and mission assurance processes, specifications, rules, best practices, etc., necessary to fulfill mission performance requirements for programs, projects, and/or major systems implemented by the Center. The Center Director (or designee) also monitors, collects, and assesses institutional, program, and project SMA financial metrics and performance results. The Center Director delegates Center SMA TA implementation responsibility to an individual in the Center's safety and mission assurance leadership. The Center SMA TA supports the lower level SMA TAs in processing changes to and waivers or deviations from requirements that are the responsibility of the SMA TA. This includes all applicable Agency and Center SMA directives, requirements, procedures, and standards. The Center Director appoints, with the approval of the NASA Chief, SMA, individuals for the position of Center SMA director (or

equivalent). The Center SMA director, in consultation with the NASA Chief, SMA, appoints program- and project-level chief safety and mission assurance officers to exercise the TA role within programs and projects.

3.3.10 The **Health and Medical Technical Authority (HMTA)** establishes and is responsible for the health and medical Agency-level policy, requirements, and standards necessary to fulfill programmatic mission performance requirements. (Refer to NPR 7120.11, NASA Health and Medical Technical Authority (HMTA) Implementation).

3.4 Process for Handling Formal Dissent

3.4.1 Programs and projects shall follow the Formal Dissent process in this Section 3.4. NASA teams have full and open discussions with all facts made available to understand and assess issues. Diverse views are to be fostered and respected in an environment of integrity and trust with no suppression or retribution. In the team environment in which NASA operates, team members often have to determine where they stand on a decision. In assessing a decision or action, a member has three choices: agree, disagree but be willing to fully support the decision, or disagree and raise a Formal Dissent. Unresolved issues of any nature (e.g., programmatic, safety, engineering, health and medical, acquisition, accounting) within a team should be quickly elevated to achieve resolution at the appropriate level.

3.4.2 Whenever a Formal Dissent is raised, it is documented and communicated by the dissenter in coordination with the disagreeing party at a minimum of two levels of management above the original program or project decision.

3.4.3 When time permits, the disagreeing parties jointly document the issue, including agreed-to facts, discussion of the differing positions with rationale and impacts, and the parties' recommendations. The joint documentation needs to be approved by the representative of each view, concurred with by affected parties, and provided to the next higher level of the involved authorities with notification to the second higher level of management. This may involve a single authority (e.g., the Programmatic Authority) or multiple authorities (e.g., Programmatic and TAs). In cases of urgency, the disagreeing parties may jointly present the information stated above orally with all affected organizations represented, advance notification to the second-higher level of management, and documentation followup.

3.4.4 A Center Director may request an expedited escalation of a Formal Dissent at the Agency level up to and including the NASA Administrator based on his or her judgment that a rapid resolution of the Formal Dissent is in the best interests of the Agency and the dissenting individual or organization.

3.4.5 Management's decision on the dissent memorandum (or oral presentation) is documented and provided to the dissenter and to the notified managers and becomes part of the program or project record. If the dissenter is not satisfied with the process or outcome, the dissenter may appeal to the next higher level of management. The dissenter has the right to take the issue upward in the organization, even to the NASA Administrator, if necessary.

3.5 Principles Related to Tailoring Requirements

3.5.1 Programs and projects shall follow the tailoring process in this Section 3.5. NASA policy is

that all prescribed requirements (requirements levied on a lower organizational level by a higher organizational level) are complied with unless relief is formally granted. Relief from a requirement may be granted in the form of a ruling that a requirement is non-applicable or in the form of a waiver or a deviation. Policy also recognizes that each program or project has unique aspects that must be accommodated to achieve mission success in an efficient and economical manner. Tailoring is the process used to adjust or seek relief from a prescribed requirement to meet the needs of a specific program or project. Tailoring is both an expected and accepted part of establishing proper requirements. For requests for relief from requirements that are the responsibility of the Chief, SMA, NPR 8715.3, NASA General Safety Program Requirements contains the SMA-specific process. For requests for relief from requirements that are the responsibility of the CHMO, NPR 7120.11 contains the HMTA specific process. Refer to the NASA Space Flight Program and Project Management Handbook for additional explanation and guidance related to the tailoring process. The handbook can be found in NODIS on the OCE tab under the “Other NASA-Level Documents” menu.

3.5.2 The evaluation and disposition of requests for tailoring (including Agency-level requirements and standards) comply with the following:

a. The request for relief from a requirement includes the rationale, a risk evaluation, and reference to all material that provides the justification supporting acceptance. The request for requirement relief is referred to as a “deviation” or “waiver” depending on the timing of the request. Deviations apply before a requirement is put under configuration control at the level the requirement will be implemented, and waivers apply after.

b. The organization submitting the tailoring request informs the next higher level of involved management in a timely manner of the tailoring request.

c. The organization at the level that established the requirement dispositions the request for tailoring of that requirement unless this authority has been formally delegated elsewhere. Such delegations will maintain the separation of Programmatic and Institutional Authorities required by governance.

d. The dispositioning organization consults with the other organizations that were involved in the establishment of the specific requirement and obtains the concurrence of those organizations having a substantive interest.

e. Approved tailoring requests become part of the retrievable program or project records.

3.5.3 A prescribed requirement that is not relevant and/or not capable of being applied to a specific program, project, system, or component can be approved as Non-Applicable (NA) by the individual who has been delegated oversight authority by the organization that established the requirement. This approval can be granted at the level where the requirement was specified for implementation (e.g., the project-level ETA could approve an NA designation for an engineering requirement). The request and approval documentation become part of the retrievable program or project records. No other formal deviation or waiver process is required.

3.5.4 A request for a permanent change to a prescribed requirement in an Agency or Center document that is applicable to all programs and projects shall be submitted as a “change request” to the office responsible for the requirement policy document unless formally delegated elsewhere.

3.5.5 Tailoring NPR 7120.5

3.5.5.1 Requests for tailoring of NPR 7120.5 requirements may be submitted in the form of the

Compliance Matrix (Appendix C) and/or by using a documented waiver request individually or in groups. (See the NASA Space Flight Program and Project Management Handbook for additional information on this request.) If requested separately from the Compliance Matrix, a waiver still needs to be recommended by the MDAA, concurred with by the Center Director, and approved by the requirement owner or as delegated.

3.5.5.2 Guidance and resources to assist programs and projects in tailoring NPR 7120.5 requirements have been established and/or developed by the Agency, Mission Directorates, and Centers. Appendix C provides:

a. The Compliance Matrix, which includes the NPR requirements, the organization or individual responsible for each requirement with authority for approving tailoring, and whether tailoring authority for the requirement is delegated or held at HQ. (See Table C-1.)

b. The process for documenting and obtaining approval for tailoring.

c. Information on different options related to the Compliance Matrix. (See Section C.1.)

d. Consultation and assistance for tailoring. (See Section C.2.)

e. Resources for developing the tailoring approach. (See Section C.3.)

An Agency Tailoring Web site, which includes many of these resources, is available at https://appel.nasa.gov/npr-7120-5-tailoring-resources.

3.6 Reimbursable Space Flight Work

3.6.1 Center Directors negotiating reimbursable space flight work with another agency shall propose NPR 7120.5 as the basis by which it will perform the space flight work. If the sponsoring agency does not want NPR 7120.5 requirements (or a subset of those requirements) to be followed, then the interagency Memorandum of Understanding/Memorandum of Agreement or the contract needs to explicitly identify those requirements that will not be followed, along with the substitute requirements for equivalent processes and any additional program/project management requirements the sponsoring agency wants. The Center obtains a formal waiver by the NASA Chief Engineer for those NPR 7120.5 requirements that are not to be followed or the Center cannot accept the work.

3.7 Use of the Metric System

3.7.1 The International System of Units (commonly known as the Système Internationale (SI) or metric system of measurement) is to be used for all new space flight projects and programs, especially in cooperative efforts with International Partners. 15 U.S.C. §205b and Executive Order 12770 provide relief from this preferential use of SI if it is found that obtaining components in SI units would result in a substantial increase in cost or unacceptable delays in schedule. Each program and project shall perform and document an assessment to determine an approach that maximizes the use of SI. This assessment will document an integration strategy if both SI and U.S. customary units are used in a project or program. The assessment is to be completed and documented in the Program Plan or Project Plan no later than the SDR.

Appendix A. Definitions

Acquisition. The process for obtaining the systems, research, services, construction, and supplies that NASA needs to fulfill its missions. Acquisition—which may include procurement (contracting for products and services)—begins with an idea or proposal that aligns with the NASA Strategic Plan and fulfills an identified need and ends with the completion of the program or project or the final disposition of the product or service.

Acquisition Strategy. The integrated strategy that enables a program or project to meet its mission objectives and provides the best value to NASA. (See a description in Section 3.4 of the Program Plan and Project Plan templates, appendices G and H.)

Acquisition Strategy Council. The ASC serves as the Agency's senior decision-making body for matters of long-term, annual, and tactical acquisition strategy planning and for matters of policy and performance assessment pertaining to the Agency's acquisition approaches. The scope and authority of the ASC includes the strategic acquisition process as defined in NPD 1000.5, Policy for NASA Acquisition. The ASC conducts Pre-ASMs and ASMs for large, high-profile programs and projects following thresholds and requirements specified in NPD 1000.5.

Acquisition Strategy Meeting. A decision-making forum where senior Agency Management reviews and approves program and project acquisition strategies. The ASM focuses on considerations such as impacting the Agency workforce, maintaining core capabilities, make-or- buy decisions, supporting Center assignments, potential partnerships, and risk. (See NPD 1000.5 for more information on ASMs.)

Agency Baseline Commitment. Establishes and documents an integrated set of project requirements, cost, schedule, technical content, and an agreed-to JCL that forms the basis for NASA's commitment to the external entities of OMB and Congress. Only one official baseline exists for a NASA program or project, and it is the Agency Baseline Commitment.

Agency Program Management Council. The senior management group, chaired by the NASA Associate Administrator or designee that is responsible for reviewing Formulation performance, recommending approval, and overseeing implementation of programs and Category 1 projects according to Agency commitments, priorities, and policies.

Agreement. The statement (oral or written) of an exchange of promises. Parties to a binding agreement can be held accountable for its proper execution and a change to the agreement requires a mutual modification or amendment to the agreement or a new agreement.

Analysis of Alternatives. A formal analysis method that compares alternative approaches by estimating their ability to satisfy mission requirements through an effectiveness analysis and by estimating their life-cycle costs through cost analysis. The results of these two analyses are used together to produce a cost-effectiveness comparison that allows decision makers to assess the relative value or potential programmatic returns of the alternatives. An analysis of alternatives broadly examines multiple elements of program/project alternatives (including technical performance, risk, LCC or initial capability cost, and programmatic aspects).

Announcement of Opportunity. An AO is one form of a NASA Broad Agency Announcement, which is a form of public/private competition. NASA solicits, accepts, and evaluates proposals submitted by all categories of proposers in response to an AO, including academia, industry, not-for-profits, Government laboratories, Federally Funded Research and Development Centers (FFRDC), NASA Centers, and the Jet Propulsion Laboratory. Regulatory coverage of AOs appears in NASA Federal Acquisition Regulation (FAR) Supplement (NFS) Part 1872. NASA typically uses a one-step or a two-step AO process. In a one-step AO process, proposals for new projects are evaluated competitively and selected for Formulation in a single

step. In two-step competitions, several proposals for new projects may be selected in Step 1 and given time to mature their concepts in a funded concept study before the Step 2 down-selection.

Approval. Authorization by a required management official to proceed with a proposed course of action. Approvals are documented.

Approval (for Implementation). Acknowledgment by the Decision Authority that the program /project has met stakeholder expectations and Formulation requirements and is ready to proceed to Implementation. By approving a program/project, the Decision Authority commits the budget resources necessary to continue into Implementation. Approval (for Implementation) is documented.

Baseline (document context). Implies the expectation of a finished product, though updates may be needed as circumstances warrant. All approvals required by Center policies and procedures have been obtained.

Baseline (general context). An agreed-to set of requirements, cost, schedule, designs, documents, etc., that will have changes controlled through a formal approval and monitoring process.

Baseline Performance Review. A monthly Agency-level independent assessment to inform senior leadership of performance and progress toward the Agency's mission and program/project performance. The monthly meeting encompasses a review of crosscutting mission support issues and all NASA mission areas.

Baseline Science Requirements. The mission performance requirements necessary to achieve the full science objectives of the mission. (Also see Threshold Science Requirements.)

Basis of Estimate. The documentation of the ground rules, assumptions, and drivers used in developing the cost and schedule estimates, including applicable model inputs, rationale or justification for analogies, and details supporting cost and schedule estimates. The basis of estimate is contained in material available to the SRB and management as part of the LCR and KDP process.

Budget. A financial plan that provides a formal estimate of future revenues and obligations for a definite period of time for approved programs, projects, and activities. (See NPR 9420.1, Budget Formulation and NPR 9470.1, Budget Execution for other related financial management terms and definitions.)

Business Case (Infrastructure). An analysis of options for construction of new facilities or infrastructure or significant modification of existing infrastructure. (See NPR 8800.15, Real Estate Management Program and Business Case Guide.)
https://www.hq.nasa.gov/office/codej/codejx/Assets/Docs/NASA_Business_Case_Guide_11_29_10.pdf

Capability Component. An individual capability within a capability portfolio or the larger capability domain. It is a system comprising workforce (i.e., FTE/WYE), equipment, facilities, processes, resources, competencies, and technologies that delivers products and services; for example, a wind tunnel and the workforce that manages, operates, and maintains it; or a complex dedicated to an end-to-end process.

Capability Portfolio. A specific collection of functionally similar site-specific capability components and enabling infrastructure strategically and centrally managed together to meet NASA's strategic goals and objectives. For example, the Space Environments Testing Management Office (SETMO) capability portfolio includes testing in high enthalpy arc jets, flight simulators, thermal vacuum chambers, and radiation laboratories. The program or project manager coordinates with capability portfolio managers on any planned investments, divestments, acquisition strategies, procurements, agreements, and changes to capability portfolio capability components in accordance with requirements and strategic guidance included in NPR 8600.1, NASA Capability Portfolio Management Requirements. NPR 8600.1 provides a link to the list of Capability Portfolios.

Center Management Council. The council at a Center that performs oversight of programs and projects by evaluating all program and project work executed at that Center.

Change Request. A change to a prescribed requirement set forth in an Agency or Center document intended for all programs and projects for all time.

Compliance Matrix. The Compliance Matrix (Appendix C) documents whether and how the program or project complies with the requirements of NPR 7120.5. It provides rationale and approvals for tailoring (waivers and deviations) requirements and is part of retrievable program and project records.

Component Facilities. Complexes that are geographically separated from the NASA Center or institution to which they are assigned but are still part of the Agency.

Concept Documentation. Documentation that captures and communicates a feasible concept that meets the goals and objectives of the mission, including results of analyses of alternative concepts, the concept of operations, preliminary risks, and potential descopes. It may include images, tabular data, graphs, and other descriptive material.

Concurrence. A documented agreement by a management official that a proposed course of action is acceptable.

Confidence Level. A probabilistic assessment of the level of confidence of achieving a specific goal.

Configuration Management. A technical and management process applying appropriate processes, resources, and controls to establish and maintain consistency between product configuration information and the product throughout the product life cycle.

Conflict of Interest. A conflict of interest involves the abuse—actual, apparent, or potential—of the trust that NASA has in its personnel. A conflict of interest is a situation in which financial or other personal considerations have the potential to compromise or bias professional judgment and objectivity. An apparent conflict of interest is one in which a reasonable person would think that the individual's judgment is likely to be compromised. A potential conflict of interest involves a situation that may develop into an actual conflict of interest. A conflict of interest exists whether or not decisions are affected by a personal interest; a conflict of interest implies only the potential for bias, not likelihood.

Considerations for a PIR. Considerations that trigger a discussion on the need for a PIR include significant changes to the program (internally or externally driven) and/or planned outcomes not being achieved that signal the need to assess program performance with respect to expectations and determine the program's ability to execute the implementation plan. Examples of significant changes to the program include:

- Significant changes to Agency policy and direction to ensure continued alignment with Agency goals and objectives and need to evaluate potential adjustments to program objectives/plans to increase support to Agency needs.
- Significant changes to interagency and/or international agreements involving the ability of NASA and/or partners to meet their commitments.
- Significant changes to the acquisition approach, including contractors and Center roles and responsibilities.
- Significant changes to budget profile.
- Significant changes to the program's constituent project(s) that impact the program and other projects.
- Unplanned scope or direction changes such as major changes in operations (e.g., step-up in capability); changes in management approach (e.g., giving mission operations responsibility to a private entity); and transition to extended operations.
- High interest from external stakeholder, advisory committee, and/or audit organizations in the program due to significant changes.

Examples of indicators that planned outcomes are not being achieved include:

- Not meeting performance goals (e.g., Agency Priority Goals).
- Risk of not meeting external or internal commitments (e.g., Space Policy Directives, interagency

and/or international agreements, cross-NASA-Center commitments) or negative customer and/or partner feedback.
- Exceeding, or at risk of exceeding, cost or schedule plans.
- Failing to make progress toward or failing to achieve Level 1 requirements.
- Carrying significant unmitigated risks.
- Recurring or unusual requests for additional funding.
- Systemic issues (could be reflection of systemic issues across projects within the program).
- Significant external and/or congressional interest in the program (e.g., heightened external sensitivity, more inquiries than normal to the Agency, significant external stakeholder focus) or actions/recommendations from external advisory committees or audit organizations (e.g., ASAP, NAC, GAO, and OIG) identifying areas that need further investigation.

Continuous Risk Management. A systematic and iterative process that efficiently identifies, analyzes, plans, tracks, controls, communicates, and documents risks associated with implementation of designs, plans, and processes.

Contract. A mutually binding legal relationship obligating the seller to furnish the supplies or services (including construction) and the buyer to pay for them. It includes all types of commitments that obligate the Government to an expenditure of appropriated funds and that, except as otherwise authorized, are in writing. In addition to bilateral instruments, contracts include (but are not limited to) awards and notices of awards; job orders or task letters issued under basic ordering agreements; letter contracts; orders, such as purchase orders, under which the contract becomes effective by written acceptance or performance; and bilateral contract modifications. Contracts do not include grants and cooperative agreements.

Convening Authority. The management official(s) responsible for convening a program/project review; establishing the Terms of Reference, including review objectives and success criteria; appointing the SRB chair; and concurring in SRB membership. These officials receive the documented results of the review.

Cost Analysis Data Requirement. A three-part document required for tightly coupled programs, loosely coupled programs, single-project programs, and projects (regardless of Category or Class) that provides critical data to assist NASA in developing high fidelity cost and schedule estimates for new NASA projects. CADRe consists of Part A “Narrative” and Part B “Technical Data” in tabular form, provided by the program or project using existing program or project material. The program or project team produces the project life-cycle cost estimate, schedule, and risk identification which is appended as Part C. For single-project programs and projects that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point, the initial capability cost plus the current Phase E cost estimate is used instead of the life-cycle cost.

Cost-Loaded Schedule. In the context of the JCL requirement, a schedule that has costs and/or resources assigned to its individual activities or summary tasks.

Decision Authority (program and project context). The individual authorized by the Agency to make important decisions on programs and projects under their authority.

Decision Memorandum. The document that summarizes the decisions made at KDPs or as necessary in between KDPs. The decision memorandum includes the Agency Baseline Commitment (if applicable), Management Agreement cost and schedule, UFE, and schedule margin managed above the project, as well as life-cycle cost and schedule estimates, as required. For single-project programs and projects that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point, the initial capability cost plus the current Phase E cost estimate is used instead of the life-cycle cost.

Decommissioning. The process of ending an operating mission and the attendant project as a result of a planned end of the mission or project termination. Decommissioning includes final delivery of any remaining project deliverables, disposal of the spacecraft and all its various supporting systems, closeout of contracts

and financial obligations, and archiving of project/mission operational and scientific data and artifacts. Decommissioning does not mean that scientific data analysis ceases, only that the project will no longer provide the resources for continued research and analysis.

Derived Requirements. Requirements arising from constraints, consideration of issues implied but not explicitly stated in the high-level direction provided by NASA HQ and Center institutional requirements, factors introduced by the selected architecture, and the design. These requirements are finalized through requirements analysis as part of the overall systems engineering process and become part of the program/project requirements baseline. Derived non-technical requirements are established by, and are the responsibility of, the Programmatic Authority. Derived technical requirements are the responsibility of the Institutional Authority.

Design Documentation. A document or series of documents that captures and communicates to others the specific technical aspects of a design. It may include images, tabular data, graphs, and other descriptive material. Design documentation is different from the CADRe, though parts of design documentation may be repeated in the latter.

Development Costs. The total of all costs from the period beginning with the approval to proceed to Implementation at the beginning of Phase C through operational readiness at the end of Phase D.

Deviation. A documented authorization releasing a program or project from meeting a requirement before the requirement is put under configuration control at the level the requirement will be implemented.

Disposal. The process of eliminating a project's assets, including the spacecraft and ground systems. Disposal includes the reorbiting, deorbiting, and/or passivation (i.e., the process of removing stored energy from a space structure at the end of mission that could result in an explosion or deflagration of the space structure) of a spacecraft.

Earned Value Management. A project management approach for measuring and assessing project performance through the integration of technical scope with schedule and cost objectives during the execution of the project. EVM provides quantification of technical progress with objective performance measurement techniques, enabling management to gain insight into project status and project completion costs and schedules. Two essential characteristics of successful EVM are EVM system data integrity and carefully targeted monthly EVM data analyses (e.g., identification of risky WBS elements).

Earned Value Management System. The integrated set of policies, processes, systems, and practices that meet an organization's implementation of EIA-748. This integrated management system and its related subsystems allow for planning all work scope to completion; assignment of authority and responsibility at the work performance level; integration of the cost, schedule, and technical aspects of the work into a detailed baseline plan; objective measurement of progress (earned value) at the work performance level; accumulation and assignment of actual costs; analysis of variances from plans; summarization and reporting of performance data to higher levels of management for action; forecast of achievement of milestones and completion of events; forecast of final costs; and disciplined baseline maintenance and incorporation of baseline revisions in a timely manner.

Engineering Requirements. Requirements defined to achieve programmatic requirements and relating to the application of engineering principles, applied science, or industrial techniques.

Ensure. To do or have what is necessary for success. (An example is: Connectivity will be ensured by testing that a signal to noise ratio of ten is maintained in environmental testing.)

Environmental Compliance. The activity of ensuring that program and project actions and decisions that may potentially affect or damage the environment are assessed during the Formulation Phase and reevaluated throughout Implementation. This activity is performed according to all NASA policy and Federal, State, Tribal government, and local environmental laws and regulations.

Environmental Impact. The direct, indirect, or cumulative beneficial or adverse effect of an action on the environment.

Evaluation. The continual self- and independent assessment of the performance of a program or project and incorporation of the evaluation findings to ensure adequacy of planning and execution according to plans.

Final (document context). Implies the expectation of a finished product. All approvals required by Center policies and procedures have been obtained.

Final Mission Report. The Final Mission Report is a summary of what the mission accomplished and is prepared at the end of a mission. It has also been called an End of Mission report, but this is not to be confused with the End of Mission Plan (EOMP) required by NPR 8715.6, NASA Procedural Requirements for Limiting Orbital Debris and Evaluating the Meteoroid and Orbital Debris Environments. The Final Mission Report generally includes a summary of the mission accomplishments, science data/samples collected, and a summary of the results achieved. This report is prepared in conjunction with documenting the mission's lessons learned as described in NPD 7120.6, Knowledge Policy for Programs and Projects and the project's Knowledge Management Plan. Projects need to ensure that resources are allocated to develop the Final Mission Report and lessons learned. These provide a valuable historical record of NASA's accomplishments and the issues that were encountered and overcome as part of the mission.

Formal Dissent. A substantive disagreement with a decision or action that an individual judges is not in the best interest of NASA and is of sufficient importance that it warrants a timely review and decision by higher-level management.

Formulation. The identification of how the program or project supports the Agency's strategic needs, goals, and objectives; the assessment of feasibility, technology, and concepts; risk assessment, team building, development of operations concepts, and acquisition strategies; establishment of high-level requirements and success criteria; the preparation of plans, budgets, and schedules essential to the success of a program or project; and the establishment of control systems to ensure performance to those plans and alignment with current Agency strategies.

Formulation Agreement. The Formulation Agreement is prepared by the project to establish the technical and acquisition work that needs to be conducted during Formulation and defines the schedule and funding requirements during Phase A and Phase B for that work.

Formulation Authorization Document. The document issued by the MDAA to authorize the formulation of a program whose goals will fulfill part of the Agency's Strategic Plan and Mission Directorate strategies and establish the expectations and constraints for activity in the Formulation Phase. In addition, a FAD or equivalent is used to authorize the formulation of a project. (See Appendix E.)

Formulation Phase. The first part of a program or project life cycle where Formulation activities are completed. The Formulation Phase begins at Approval for Formulation and ends at Approval for Implementation as depicted in life-cycle figures 2-2 through 2-5 of this NPR.

Funding (budget authority). The authority provided by law to incur financial obligations that will result in expenditures. There are four basic forms of budget authority, but only two are applicable to NASA: appropriations and spending authority from offsetting collections (reimbursables and working capital funds). Budget authority is provided or delegated to programs and projects through the Agency's funds distribution process.

Health and Medical Requirements. Requirements defined by the Office of the Chief Health and Medical Officer (OCHMO).

Human Systems Integration. A required interdisciplinary integration of the human as an element of the system to ensure that the human and software/hardware components cooperate, coordinate, and communicate effectively to perform a specific function or mission successfully.

Implementation. The execution of approved plans for the development and operation of the program/project and the use of control systems to ensure performance to approved plans and continued alignment with the Agency's strategic needs, goals, and objectives.

Implementation Phase. The second part of a program or project life cycle where Implementation activities are completed. The Implementation Phase begins at Approval for Implementation and continues through the end of the program or project as depicted in life-cycle figures 2-2 through 2-5 of this NPR.

In-House (EVM). Project work scope conducted solely using NASA HQ and/or Center personnel or other NASA resources (i.e., facilities, equipment), including support contractors that augment NASA resources to achieve the objectives of the project. There is no prime contractor, university, laboratory, institution, or foreign partner involvement in in-house work.

Independent Assessment(s) (includes reviews, evaluations, audits, analysis oversight, investigations). Assessments are independent to the extent the involved personnel apply their expertise impartially and without any conflict of interest or inappropriate interference or influence, particularly from the organization(s) being assessed.

Independent Funding (context of Technical Authority). The funding of Technical Authorities is considered independent if funding originating from the Mission Directorate or other Programmatic Authorities is provided to the Center in a manner that cannot be used to influence the technical independence or security of Technical Authorities.

Industrial Base. The capabilities residing in either the commercial or government sector required to design, develop, manufacture, launch, and service the program or project. This encompasses related manufacturing facilities, supply chain operations and management, a skilled workforce, launch infrastructure, research and development, and support services.

Information Technology. Any equipment or interconnected system or subsystem of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by an executive Agency. Information technology also includes computers; ancillary equipment (including imaging peripherals, input, output, and storage devices necessary for security and surveillance); peripheral equipment designed to be controlled by the central processing unit of a computer; software; firmware; and similar procedures, services (including support services), and related resources. It does not include any equipment acquired by a Federal contractor incidental to a Federal contract.

Infrastructure Requirements. The facilities real property (buildings and/or other structures) and environmental, aircraft, personal property, collateral equipment, and associated system resources that are needed to support programs and projects. Utilization of the capability afforded by the infrastructure includes consideration of the life-cycle cost (design, construction, commissioning, outfitting, special test equipment, utilities, operations and maintenance, and future disposal cost) and other liabilities it presents. The construction of real property infrastructure or the modification of existing infrastructure above a defined dollar amount must go through the Agency's Construction of Facilities account (CECR). (See NPR 8820.2, Facility Project Requirements and NPR 8800.15, Real Estate Management Program.)

Initial Capability. For single-project programs and projects that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point, the initial capability is the first operational mission flight or as defined as part of the KDP B review plan. The scope of the initial capability is documented in the KDP B Decision Memorandum.

Institutional Authority. Institutional Authority encompasses all those organizations and authorities not in the Programmatic Authority. This includes engineering, safety and mission assurance, and health and medical organizations; mission support organizations; and Center Directors.

Institutional Requirements. Requirements that focus on how NASA does business that are independent of the particular program or project. There are five types: engineering, program/project management, safety and mission assurance, health and medical, and mission support requirements.

Integrated Baseline Review. A risk-based review conducted by Program/Project Management to ensure a mutual understanding between the customer and supplier of the risks inherent in the supplier's Performance Measurement Baseline (PMB) and to ensure that the PMB is realistic for accomplishing all of the authorized work within the authorized schedule and budget.

Integrated Center Management Council. The forum used by projects and programs that are being implemented by more than one Center and includes representatives from all participating Centers. The ICMC will be chaired by the director of the Center (or representative) responsible for program or project management.

Integrated Logistics Support. The management, engineering activities, analysis, and information management associated with design requirements definition, material procurement and distribution, maintenance, supply replacement, transportation, and disposal that are identified by space flight and ground systems supportability objectives.

Integrated Master Schedule. A logic network-based schedule that reflects the total project scope of work, traceable to the WBS, as discrete and measurable tasks/milestones and supporting elements that are time phased through the use of valid durations based on available or projected resources and well-defined interdependencies.

Integrated Program Management Report. The standard report format to communicate program/project monthly cost/schedule performance and status between a contractor and the Government. The IPMR consists of seven report formats that provide program/project managers information to: integrate cost and schedule performance data with technical performance measures, identify the magnitude and impact of actual and potential problem areas causing significant cost and schedule variances, forecast schedule completions, and provide valid, timely program/project status information to higher management for effective decision making. This is a contract data requirement when EVM is required.

Integration Plan. The integration and verification strategies for a project interface with the system design and decomposition into the lower-level elements. The integration plan is structured to bring the elements together to assemble each subsystem and to bring all of the subsystems together to assemble the system/product. The primary purposes of the integration plan are: (1) to describe this coordinated integration effort that supports the implementation strategy, (2) to describe for the participants what needs to be done in each integration step, and (3) to identify the required resources and when and where they will be needed.

Interface Control Document. An agreement between two or more parties on how interrelated systems will interface with each other. It documents interfaces between things like electrical connectors (e.g., what type, how many pins, what signals will be on each of the pins, etc.); fluid connectors (type of connector or of fluid being passed, flow rates of the fluid, etc.); mechanical (types of fasteners, bolt patterns, etc.); and any other interfaces that might be involved.

Joint Cost and Schedule Confidence Level. The probability that cost will be equal to or less than the targeted cost and schedule will be equal to or less than the targeted schedule date. The JCL calculation includes consideration of the risk associated with all elements, regardless of whether or not they are funded from appropriations or managed outside of the project (e.g., risk impacts of a foreign contribution behind schedule, risk impacts of the Launch Vehicle). JCL calculations include content from the milestone at which the JCL is calculated through the completion of Phase D activities. (See the NASA Cost Estimating Handbook for more information on JCL.)

Key Decision Point. The event at which the Decision Authority determines the readiness of a program/project to progress to the next phase of the life cycle (or to the next KDP).

Knowledge Management. A collection of policies, processes, and practices relating to the use of intellectual and knowledge-based assets in an organization.

Lessons Learned. Captured knowledge or understanding gained through experience which, if shared, would benefit the work of others. Unlike a best practice, lessons learned describes a specific event that occurred and provides recommendations for obtaining a repeat of success or for avoiding reoccurrence of an adverse work practice or experience.

Life-Cycle Cost. The total of the direct, indirect, recurring, nonrecurring, and other related expenses both incurred and estimated to be incurred in the design, development, verification, production, deployment, prime mission operation, maintenance, support, and disposal of a project, including closeout, but not extended operations. The LCC of a project or system can also be defined as the total cost of ownership over the project or system's planned life cycle from Formulation (excluding Pre-Phase A) through Implementation (excluding extended operations). The LCC includes the cost of the launch vehicle.

Life-Cycle Review. A review of a program or project designed to provide a periodic assessment of the technical and programmatic status and health of a program or project at a key point in the life cycle (e.g., Preliminary Design Review (PDR) or Critical Design Review (CDR)). Certain life-cycle reviews provide the basis for the Decision Authority to approve or disapprove the transition of a program/project at a KDP to the next life-cycle phase.

Loosely Coupled Programs. These programs address specific objectives through multiple space flight projects of varied scope. While each individual project has an assigned set of mission objectives, architectural and technological synergies and strategies that benefit the program as a whole are explored during the Formulation process. For instance, Mars orbiters designed for more than one Mars year in orbit are required to carry a communication system to support present and future landers.

Management Agreement. Within the Decision Memorandum, the parameters and authorities over which the program or project manager has management control constitute the program or project Management Agreement. A program or project manager has the authority to manage within the Management Agreement and is accountable for compliance with the terms of the agreement.

Margin. The allowances carried in budget (See Unallocated Future Expenses), projected schedules, and technical performance parameters (e.g., weight, power, or memory) to account for uncertainties and risks. Margins are allocated in the formulation process, based on assessments of risks, and are typically consumed as the program/project proceeds through the life cycle.

Metric. A measurement taken over a period of time that communicates vital information about the status or performance of a system, process, or activity.

Mission. A major activity required to accomplish an Agency goal or to effectively pursue a scientific, technological, or engineering opportunity directly related to an Agency goal. Mission needs are independent of any particular system or technological solution.

Mission Directorate Program Management Council. The forum that evaluates all programs and projects executed within that Mission Directorate and provides input to the MDAA. For programs and Category 1 projects, the MDAA carries forward the DPMC findings and recommendations to the APMC.

Mission Resilience. The ability of a mission system to withstand or recover from adverse conditions such as intrusion, subversion, disruption, degradation, or destruction from environmental or hostile causes.

Mission Support Office Requirements. Requirements defined by mission support offices (e.g., procurement and infrastructure).

Non-Applicable Requirement. Any requirement that is not relevant or not capable of being applied. The

non-applicable requirement provision is intended to provide an efficient means to grant and document relief from a requirement not relevant or not capable of being applied to the specific mission. The need for relief from the requirement is obvious and the judgment of non-applicable is likely to be the same regardless of who makes the determination. For example, the requirement to produce a Human Rating Certification Package is non-applicable for a robotic project.

Operations Concept Documentation. A description of how the flight system and the ground system are used together to ensure that the concept of operation is reasonable. This might include how mission data of interest, such as engineering or scientific data, are captured, returned to Earth, processed, made available to users, and archived for future reference. The Operations Concept documentation should describe how the flight system and ground system work together across mission phases for launch, cruise, critical activities, science observations, and end of mission to achieve the mission.

Operations Handbook. The Operations Handbook provides information essential to the operation of a spacecraft and other components of a mission. It generally includes a description of the spacecraft and other mission components and the operational support infrastructure; operational procedures, including step-by-step operational procedures for activation and deactivation; malfunction detection procedures; and emergency procedures. The handbook identifies the commands for the spacecraft and other mission components, defines the functions of these commands, and provides supplemental reference material for use by the operations personnel. The main emphasis is placed on command types, command definitions, command sequences, and operational constraints. Additional document sections may describe uploadable operating parameters, the telemetry stream data contents (for both the science and the engineering data), the Mission Operations System displays, and the spacecraft and other mission component health monitors.

Orbital Debris. Any object placed in space by humans that remains in orbit and no longer serves any useful function. Objects range from spacecraft to spent launch vehicle stages to components and also include materials, trash, refuse, fragments, and other objects that are overtly or inadvertently cast off or generated.

Performance Measurement Baseline. The time-phased budget plan for accomplishing all authorized work scope in a project's life cycle, which includes both NASA internal costs and supplier costs. The PMB is used to measure project performance using EVM, if required, or other performance measurement techniques if EVM is not required. It is formed by the budgets assigned to scheduled control accounts and the applicable indirect budgets. For future effort, not planned to the control account level, the PMB also includes budgets assigned to higher level WBS elements and undistributed budgets. The PMB does not include UFE, or management reserve (MR) for contractors.

Pre-Acquisition Strategy Meeting. A precursor meeting to the ASM, where a small group of senior Agency management discusses preliminary acquisition strategies in preparation for the ASM, to enable insight for the Associate Administrator and to allow information exchange about strategic options prior to presenting the fully developed acquisition strategy at the ASM. Pre-ASMs are not always required, as determined by the convening authority. (See NPD 1000.5 for more information on Pre-ASMs.)

Preliminary (document context). Implies that the product has received initial review in accordance with Center best practices. The content is considered correct, though some TBDs may remain. All approvals required by Center policies and procedures have been obtained. Major changes are expected.

Prescribed Requirement. A requirement levied on a lower organizational level by a higher organizational level.

Principal Investigator. A person who conceives an investigation and is responsible for carrying it out and reporting its results. In some cases, PIs from industry and academia act as project managers for smaller development efforts with NASA personnel providing oversight.

Procurement Strategy Meeting. A forum where management reviews and approves the approach for the Agency's major and other selected procurements. Chaired by the Assistant Administrator for Procurement

(or designee), the Procurement Strategy Meeting (PSM) addresses and documents information, activities, and decisions required by the FAR and NFS and incorporates NASA strategic guidance and decisions from the ASM strategic acquisition meeting to ensure the alignment of the individual procurement action with NASA's portfolio and mission.

Program. A strategic investment by Mission Directorates or mission support offices that has a defined architecture and/or technical approach, requirements, funding level, and management structure that initiates and directs one or more projects. A program implements a strategic direction that the Agency has identified as needed to accomplish Agency goals and objectives. (See Section 2.1.2.)

Program Commitment Agreement. The contract between the AA and the responsible MDAA that authorizes transition from Formulation to Implementation of a program. (See Appendix D.)

Program/Project Management Requirements. Requirements that focus on how NASA and Centers perform program and project management activities.

Program Plan. The document that establishes the program's baseline for Implementation, signed by the MDAA, Center Director(s), and program manager.

Program (Project) Team. All participants in program (project) Formulation and Implementation. This includes all direct reports and others that support meeting program (project) responsibilities.

Programmatic Authority. Programmatic Authority includes the Mission Directorates and their respective program and project managers. Individuals in these organizations are the official voices for their respective areas. Programmatic Authority sets, oversees, and ensures conformance to applicable programmatic requirements.

Programmatic Requirements. Requirements set by the Mission Directorate, program, project, and PI, if applicable. These include strategic scientific and exploration requirements, system performance requirements, safety requirements, and schedule, cost, and similar nontechnical constraints.

Project. A space flight project is a specific investment identified in a Program Plan having defined requirements, a life-cycle cost, a beginning, and an end. A project also has a management structure and may have interfaces to other projects, agencies, and international partners. A project yields new or revised products that directly address NASA's strategic goals.

Project Plan. The document that establishes the project's baseline for Implementation, signed by the responsible program manager, Center Director, project manager, and the MDAA, if required. (See Appendix H.)

Project Scientist. For PI-led competed projects, the project scientist is part of the PI team and works closely with the PI. The project scientist is typically delegated the responsibility to monitor the scientific output of the project and ensure that the project achieves each of its science requirements. For directed projects, there is no mission PI. The project scientist is nominated by the Center and approved by the Mission Directorate and is responsible for a more significant fraction of the project-level management than in a competed project. The project scientist works closely with the project manager and is directly responsible for all science related tasks. Project scientists are primarily associated with SMD projects.

Rebaselining. The process that results in a change to a project's Agency Baseline Commitment.

Reimbursable Program/Project. A project (including work, commodities, or services) for customers other than NASA for which reimbursable agreements have been signed by both the customer and NASA. The customer provides funding for the work performed on their behalf.

Replanning. The process by which a program or project updates or modifies its plans.

Request for Action/Review Item Discrepancy. The most common names for the comment forms that reviewers submit during life-cycle reviews that capture their comments, concerns, and/or issues about the product or documentation.

Residual Risk. The remaining risk that exists after all mitigation actions have been implemented or exhausted in accordance with the risk management process. (See NPD 8700.1, NASA Policy for Safety and Mission Success.)

Risk. In the context of mission execution, risk is the potential for performance shortfalls, which may be realized in the future, with respect to achieving explicitly established and stated performance requirements. The performance shortfalls may be related to any one or more of the following mission execution domains: (1) safety, (2) technical, (3) cost, and (4) schedule. (See NPR 8000.4, Agency Risk Management Procedural Requirements.)

Risk Assessment. An evaluation of a risk item that determines: (1) what can go wrong, (2) how likely is it to occur, (3) what the consequences are, (4) what the uncertainties are that are associated with the likelihood and consequences, and (5) what the mitigation plans are.

Risk Management. Risk management includes risk-informed decision making (RIDM) and continuous risk management (CRM) in an integrated framework. RIDM informs systems engineering decisions through better use of risk and uncertainty information in selecting alternatives and establishing baseline requirements. CRM manages risks over the course of the development and the Implementation Phase of the life cycle to ensure that safety, technical, cost, and schedule requirements are met. This is done to foster proactive risk management, to better inform decision making through better use of risk information, and then to more effectively manage Implementation risks by focusing the CRM process on the baseline performance requirements emerging from the RIDM process. (See NPR 8000.4, Agency Risk Management Procedural Requirements.) These processes are applied at a level of rigor commensurate with the complexity, cost, and criticality of the program.

Risk-Informed Decision Making. A risk-informed decision-making process uses a diverse set of performance measures (some of which are model-based risk metrics) along with other considerations within a deliberative process to inform decision making.

Risk-Informed Probabilistic Analysis. Analysis informed by all appropriate discrete risks and uncertainties including those that may not be discretely managed in the risk management system.

Safety. Freedom from those conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment.

Safety and Mission Assurance Requirements. Requirements defined by the SMA organization related to safety and mission assurance.

Security. Protection of people, property, and information assets owned by NASA that covers physical assets, personnel, IT, communications, and operations.

Signature. A distinctive mark, characteristic, or thing that indicates identity; one’s name as written by oneself.

Single-Project Programs. These programs tend to have long development and/or operational lifetimes, represent a large investment of Agency resources, and have contributions from multiple organizations/agencies. These programs frequently combine program and project management approaches, which they document through tailoring.

Stakeholder. An individual or organizational customer having an interest (or stake) in the outcome or deliverable of a program or project.

Standards. Formal documents that establish a norm, requirement, or basis for comparison, a reference point to measure or evaluate against. A technical standard, for example, establishes uniform engineering or technical criteria, methods, processes, and practices. (Refer to NPR 7120.10, Technical Standards for NASA Programs and Projects.)

Standing Review Board. The board responsible for conducting independent reviews (life cycle and special) of a program/project and providing objective, expert judgments to the convening authorities. The reviews are conducted in accordance with approved Terms of Reference (ToR) and life-cycle requirements per this document and NPR 7123.1.

Success Criteria. That portion of the top-level requirements that defines what is to be achieved to successfully satisfy NASA Strategic Plan objectives addressed by the program or project.

Suppliers. Each project office is a customer having a unique, multi-tiered hierarchy of suppliers to provide it products and services. A supplier may be a contractor, grantee, another NASA Center, university, international partner, or other government agency. Each project supplier is also a customer if it has authorized work to a supplier lower in the hierarchy.

Supply Chain. The specific group of suppliers and their interrelationships that is necessary to design, develop, manufacture, launch, and service the program or project. This encompasses all levels within a space system, including providers of raw materials, components, subsystems, systems, systems integrators, and services.

System. The combination of elements that function together to produce the capability required to meet a need. The elements include all hardware, software, equipment, facilities, personnel, processes, and procedures needed for this purpose.

Systems Engineering. Per NPR 7123.1, NASA systems engineering is a logical systems approach performed by multidisciplinary teams to engineer and integrate NASA's systems to ensure NASA products meet the customer's needs. Implementation of this systems approach will enhance NASA's core engineering capabilities while improving safety, mission success, and affordability. This systems approach is applied to all elements of a system (i.e., hardware, software, and human) and all hierarchical levels of a system over the complete program/project life cycle.

Tailoring. The process used to adjust or seek relief from a prescribed requirement to accommodate the needs of a specific task or activity (e.g., program or project). The tailoring process results in the generation of deviations and waivers depending on the timing of the request.

Technical Authority. Part of NASA's system of checks and balances that provides independent oversight of programs and projects in support of safety and mission success through the selection of individuals at delegated levels of authority. These individuals are the Technical Authorities. Technical Authority delegations are formal and traceable to the Administrator. Individuals with Technical Authority are funded independently of a program or project.

Technical Authority Requirements. Requirements invoked by OCE, OSMA, and Office of the Chief Health and Medical Officer (OCHMO) documents (e.g., NPRs or technical standards cited as program or project requirements) or contained in Center institutional documents. These requirements are the responsibility of the office or organization that established the requirement unless delegated elsewhere.

Technical Standard. Common and repeated use of rules, conditions, guidelines, or characteristics for products or related processes and production methods and related management systems practices; the definition of terms, classification of components; delineation of procedures; specification of dimensions, materials, performance, designs, or operations; measurement of quality and quantity in describing materials, processes, products, systems, services, or practices; test methods and sampling procedures; or descriptions of fit and measurements of size or strength. (Source: OMB Circular No. A-119, Federal Participation in the

Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities.) (See NPR 7120.10, Technical Standards for NASA Programs and Projects.)

Technology Readiness Level. Provides a scale against which to measure the maturity of a technology. TRLs range from 1, Basic Technology Research, to 9, Systems Test, Launch, and Operations. Typically, a TRL of 6 (i.e., technology demonstrated in a relevant environment) is required for a technology to be integrated into a flight system. (See NASA Systems Engineering Handbook NASA/SP-2007-6105 Rev 1, p. 296 for more information on TRL levels and technology assessment, and SP-20205003605, Technology Readiness Assessment Best Practices Guide.)

Termination Review. A review initiated by the Decision Authority for the purpose of securing a recommendation as to whether to continue or terminate a program or project. Failing to stay within the parameters or levels specified in controlling documents will result in consideration of a termination review. (See NASA/SP-2014-3705, NASA Space Flight Program and Project Management Handbook for information on a Termination Review.)

Terms of Reference. A document specifying the nature, scope, schedule, and ground rules for an independent review or independent assessment.

Threshold Science Requirements. The mission performance requirements necessary to achieve the minimum science acceptable for the investment. In some AOs used for competed missions, threshold science requirements may be called the “science floor” for the mission. (Also see Baseline Science Requirements.)

Tightly Coupled Programs. Programs with multiple projects that execute portions of a mission(s). No single project is capable of implementing a complete mission. Typically, multiple NASA Centers contribute to the program. Individual projects may be managed at different Centers. The program may also include other agency or international partner contributions.

Unallocated Future Expenses. The portion of estimated cost required to meet a specified confidence level that has not been allocated to the specific project WBS sub-elements because the probabilistic estimate includes risks and uncertainties. For additional information on UFE, see the NASA Space Flight Program and Project Management Handbook.

Uncoupled Programs. Programs implemented under a broad theme and/or a common program implementation concept, such as providing frequent flight opportunities for cost-capped projects selected through AO or NASA Research Announcements. Each such project is independent of the other projects within the program.

Validation. The process of showing proof that the product accomplishes the intended purpose based on stakeholder expectations. May be determined by a combination of test, analysis, demonstration, and inspection. (Answers the question, “Am I building the right product?”)

Verification. Proof of compliance with requirements. Verification may be determined by a combination of test, analysis, demonstration, and inspection. (Answers the question, “Did I build the product right?”)

Waiver. A documented authorization releasing a program or project from meeting a requirement after the requirement is put under configuration control at the level the requirement will be implemented.

Work Breakdown Structure. A product-oriented hierarchical division of the hardware, software, services, and data required to produce the program’s or project’s end product(s), structured according to the way the work will be performed and reflecting the way in which program/project costs and schedule, technical, and risk data are to be accumulated, summarized, and reported.

Appendix B. Acronyms

AA	Associate Administrator
ABC	Agency Baseline Commitment
AI&T	Assembly, Integration, and Test
AO	Announcement of Opportunity
APMC	Agency Program Management Council
ASC	Acquisition Strategy Council
ASM	Acquisition Strategy Meeting
BOE	Basis of Estimate
BPR	Baseline Performance Review
CADRe	Cost Analysis Data Requirement
CDR	Critical Design Review
CE	Chief Engineer
CERR	Critical Events Readiness Review
CFO	Chief Financial Officer
CHMO	Chief Health and Medical Officer
CIO	Chief Information Officer
CMC	Center Management Council
COI	Conflict of Interest
COOP	Continuity of Operations
CPD	Center Policy Directive
CPR	Center Procedural Requirements
CRM	Continuous Risk Management
DPMC	Mission Directorate Program Management Council
DR	Decommissioning Review
DRR	Disposal Readiness Review
ELV	Expendable Launch Vehicle
EMD	Environmental Management Division
EOMP	End of Mission Plan
ETA	Engineering Technical Authority
EVM	Earned Value Management

EVMS	EVM System
FAD	Formulation Authorization Document
FAR	Federal Acquisition Regulation
FC	Fully Compliant
FFRDC	Federally Funded Research and Development Centers
FRED	Facilities Real Estate Division
FRR	Flight Readiness Review
FTE	Full-Time Employee
GDS	Ground Data System
HMTA	Health and Medical Technical Authority
HQ	Headquarters
HSI	Human Systems Integration
IBR	Integrated Baseline Review
ICD	Interface Control Document
ICMC	Integrated Center Management Council
ILS	Integrated Logistics Support
IMS	Integrated Master Schedule
IPMR	Integrated Program Management Report
IT	Information Technology
JCL	Joint Cost and Schedule Confidence Level
KDP	Key Decision Point
LCC	Life-Cycle Cost
LCR	Life-Cycle Review
LDE	Lead Discipline Engineer
LMD	Logistics Management Division
LRR	Launch Readiness Review
MCR	Mission Concept Review
MDAA	Mission Directorate Associate Administrator
MdM	Meta-Data Manager
MDR	Mission Definition Review
MOS	Mission Operations System
MOU	Memorandum of Understanding

MRR	Mission Readiness Review
MSD	Mission Support Directorate
NA	Non-Applicable
NEN	NASA Engineering Network
NEPA	National Environmental Policy Act
NESC	NASA Engineering and Safety Center
NFS	NASA Federal Acquisition Regulation (FAR) Supplement
NID	NASA Interim Directive
NOA	New Obligation Authority
NODIS	NASA Online Directives Information System
NPD	NASA Policy Directive
NPR	NASA Procedural Requirements
OCE	Office of the Chief Engineer
OCFO	Office of the Chief Financial Officer
OCHMO	Office of the Chief Health and Medical Officer
OCIO	Office of the Chief Information Officer
OComm	Office of Communications
ODAR	Orbital Debris Assessment Report
OGC	Office of the General Counsel
OIIR	Office of International and Interagency Relations
OMB	Office of Management and Budget (Executive Office of the White House)
OPS	Office of Protective Services
ORR	Operational Readiness Review
OSI	Office of Strategic Infrastructure
OSMA	Office of Safety and Mission Assurance
PCA	Program Commitment Agreement
PCE	Program (or Project) Chief Engineer
PDR	Preliminary Design Review
POC	Point of Contact
PFAR	Post-Flight Assessment Review
PI	Principal Investigator
PIR	Program Implementation Review

PLAR	Post-Launch Assessment Review
PMB	Performance Measurement Baseline
PMC	Program Management Council
PMIAA	Program Management Improvement and Accountability Act
PMIO	Program Management Improvement Officer
PPBE	Planning, Programming, Budgeting, and Execution
PRA	Probabilistic Risk Assessment
Pre-ASM	Pre-Acquisition Strategy Meeting
PRR	Production Readiness Review
PSM	Procurement Strategy Meeting
RFA	Request for Action
RFP	Request for Proposal
RID	Review Item Discrepancy
RIDM	Risk-Informed Decision Making
SAR	System Acceptance Review
SDR	System Definition Review
SEMP	Systems Engineering Management Plan
SI	Système Internationale (or metric) system of measurement
SID	Strategic Investments Division
SIR	System Integration Review
SMA	Safety and Mission Assurance
SMD	Science Mission Directorate
SMSR	Safety and Mission Success Review
SRB	Standing Review Board
SRR	System Requirements Review
TA	Technical Authority
TBD	To Be Determined
TBR	To Be Resolved
TRL	Technology Readiness Level
ToR	Terms of Reference
UFE	Unallocated Future Expenses
WBS	Work Breakdown Structure

WYE Work Year Equivalent

Appendix C. Compliance Matrix and Tailoring Guidance and Resources

Guidance and resources to assist programs and projects in tailoring NPR 7120.5, NASA Space Flight Program and Project Management Requirements, requirements have been established and/or developed by the Agency, Mission Directorates, and Centers. These include compliance matrices (see Section C.1), consultation and assistance for tailoring (see Section C.2), and resources for developing the tailoring approach (see Section C.3). An Agency Tailoring Web site which includes many of these resources is available at https://appel.nasa.gov/npr-7120-5-tailoring-resources.

C.1 Compliance Matrix

C.1.1 The Compliance Matrix documents the program's or project's compliance with the requirements of NPR 7120.5 or how the program or project is tailoring the requirements in accordance with Section 3.5. It is submitted as part of the Formulation Agreement, Program Plan, or Project Plan. The Compliance Matrix is provided to streamline the tailoring (waiver and deviation) process described in Section 3.5 and may be used to document approval for designating requirements as non-applicable. (See Section 3.5.3.) If the Compliance Matrix is completed in accordance with these instructions, it meets the requirements for requesting tailoring and for designating requirements as non-applicable and serves as a group submittal for waivers to NPR 7120.5. Once the Formulation Agreement or Program or Project Plan is signed, tailoring and non-applicable designations are approved. A copy is forwarded to OCE. If the Compliance Matrix changes or if compliance is phased for existing programs or projects, updated versions of the Compliance Matrix are incorporated into an approved Formulation Agreement or Program or Project Plan revision.

C.1.2 Compliance Matrix options have been developed to facilitate the tailoring process. Programs and projects may use the full Compliance Matrix, or, if applicable, a pre-customized Compliance Matrix template, or a pre-approved Blanket Tailoring Compliance Matrix. (See Agency Tailoring Web site for examples of these Compliance Matrices and templates.) The project manager or program manager should coordinate with the program or the Mission Directorate, respectively, to select and obtain the appropriate approval for using a Compliance Matrix other than the full Compliance Matrix. Instructions for completing a Compliance Matrix are provided below.

a. Full Compliance Matrix: The full Compliance Matrix is provided in Table C-1 and on the Agency Tailoring Web site. It is also available on the OCE tab under the "Other NASA-Level Documents" menu in NODIS.

b. Pre-customized Compliance Matrix Templates: These Compliance Matrix templates eliminate non-applicable requirements for specific types of programs and projects. Programs and projects may choose to use the applicable pre-customized template instead of the full Compliance Matrix in Table C-1 to document and obtain approval for tailoring. Examples of pre-customized compliance matrix templates include templates for Uncoupled and Loosely Coupled Programs, Tightly Coupled Programs, Single-Project Programs, and projects.

c. Pre-approved Blanket Tailoring Compliance Matrices: Mission Directorates and programs may and are encouraged to develop tailored Compliance Matrices and obtain approval for tailoring specific types of programs and projects under their purview. Mission Directorates and programs are required to follow the instructions outlined in "Template Instructions" (see below) for identifying tailored requirements, developing justifications for tailoring, and obtaining approval for tailoring from requirement owners and from OCE to establish a pre-approved blanket tailoring Compliance Matrix. Programs and projects that are eligible to invoke these pre-approved Compliance Matrices are not required to obtain approval for the tailored requirements since that approval has already been obtained by the Mission Directorate or program. (Approval for additional tailoring is required.) For example, the STMD Technology Demonstration Program has a pre-approved Compliance Matrix.

C.1.3 Template Instructions

C.1.3.1 The Compliance Matrix lists:

a. The paragraph reference.

b. The NPR 7120.5 requirement statement.

c. The "requirement owner" (the organization or individual responsible for the requirement).

d. Whether tailoring authority for the requirement is delegated or held at HQ.

e. The organization or individual to whom the requirement applies (MDAA, CD, PM).

f. A "comply?" column to describe applicability or intent to tailor.

g. The "justification" column to justify the rationale for tailoring and how tailoring is to be applied.

h. The "approval" column when signatures are required to approve tailoring.

C.1.3.2 The "Requirement Owner" column designates which organization is responsible for maintaining the requirement for the Agency. The head of the requirement owner's organization has the authority for approving tailoring unless this authority has been formally delegated. The "Delegated" column indicates whether the HQ's requirement owner has delegated or retained approval authority for tailoring of the requirement.

a. "Yes" in the "Delegated" column indicates that tailoring authority has been delegated by the requirement owner.

b. "No" in the "Delegated" column indicates that tailoring authority has been retained by the requirement owner.

c. Check the Agency Tailoring Web site for the POC who can provide the name of the HQ person with tailoring approval authority or the organization to which the authority is delegated.

d. If the "Delegated" column is blank, programs and projects should:

(1) Check the Agency Tailoring Web site for information on delegation by the requirement owner and/or

(2) Check the Agency Tailoring Web site for the HQ requirement owner's POC and work with the POC to determine if tailoring authority has been retained or delegated.

C.1.3.3 The next three columns ("MDAA," "CD," and "PM") designate to whom the requirement applies. An "A" in the column indicates applicability. Programs and projects do not need to address requirements that are not applicable to "PM."

C.1.3.4 The "Comply?" column is filled in by the program or project to identify the program's or project's approach to the requirement. The project inserts an "FC" for "fully compliant," "T" for "tailored," or "NA" for a requirement that is "non-applicable," per Section 3.5.3. (See Appendix A for the definition of a Non-Applicable Requirement.)

C.1.3.5 The column titled "Justification" documents the rationale for tailoring, documents how the requirement will be tailored, or justifies why the requirement is not applicable. It is expected that much of the rationale will already have been developed in retrievable program and/or project records and can simply be referenced (in an appropriate, accessible form). The level of documentation should be commensurate with the significance of departure from the norm and is determined by the requirement owner or as delegated. In the case where evaluation indicates that the tailoring of a requirement increases risk, evidence of official acceptance of that risk should be provided as referenced in retrievable program or project records. Columns in the Compliance Matrix can be adjusted to accommodate the necessary information.

C.1.3.6 The "Approval" column is used to indicate approval for tailored requirements. The name, title, and signature of the responsible authority (requirement owner or delegate) in this column indicates that approval and any required concurrences have been obtained. The requirement owner consults with the other organizations that were involved in the establishment of the specific requirement and obtains the concurrence of those organizations having a substantive interest.

a. The name, title, and signature of the responsible authority indicating approval of tailoring is required only for tailored requirements, i.e., those requirements with a "T" in the "Comply" column. This is not required for requirements with "NA" in the "Comply" column.

b. For requirements for which tailoring authority has been retained, program and project managers should work with the HQ requirement owners' POCs to obtain the names of individuals with tailoring approval authority.

c. For requirements that have been delegated, program and project managers should work with the delegated representative or with the HQ requirement owners' POCs to obtain information specific to the delegated authorities.

C.1.3.7 Redundant signatures are not required in the "Approval" column of the Compliance Matrix, if the requirement owner is already a required signatory (e.g., MDAA, Center Director, program manager, and project manager) on the Formulation Agreement, Program Plan, or Project Plan. An example of this would be OCE requirements that have been delegated to the Center Director. In this case, a separate signature by the Center Director is not required in the "Approval" column since the Center Director is a signatory on the plan. However, if tailoring was proposed for a requirement by an owner who isn't normally a signatory on the Formulation Agreement, Program Plan, or Project Plan (e.g., OSMA), the program or project manager should obtain the signature of the approving official in the "Approval" column of the Compliance Matrix prior to submitting the Formulation Agreement, Program Plan, or Project Plan for

final signature.

C.2 Consultation and Assistance for Tailoring

C.2.1 HQ requirements owners and some Mission Directorates have identified points-of-contact for consulting with and assisting programs and projects in developing their tailoring approach and in obtaining approval for tailoring as described below. A list of these points-of-contact is provided on the Agency Tailoring Web site.

a. Points-of-contact for HQ requirements owners are available to assist programs and projects in identifying the tailoring authority designated to approve tailoring of requirements owned by their organization, i.e., either the name of the HQ person or the organization to which the authority is delegated. In addition, some HQ requirements owners provide documented information on delegation of tailoring authority.

b. OCE point(s)-of-contact are available to provide consultation to programs and projects in developing their tailoring approach. The level of support depends on the extent of tailoring needed and may range from a simple phone conversation to identifying a group of tailoring SMEs (at HQ and/or Centers) that can help a program or project develop and gain agreement for their tailoring approach.

c. Mission Directorates may designate points-of-contact to obtain tailoring approval from requirement owners for programs and projects.

d. The NASA Program and Project Management Board (PPMB) may assist programs and projects in tailoring requirements and provide guidance through the tailoring process. The PPMB may be engaged to determine whether to endorse the program's or project's tailoring and adjudicate issues related to tailoring between requirement owners and programs and projects. Individual requirement owners retain the responsibility and authority to approve tailoring of requirements. Program and project managers interested in assistance from the PPMB should contact the OCE PPMB Manager or their Center representative to the PPMB. The OCE PPMB Manager is identified in the points-of-contact list on the Agency Tailoring Web site. Additionally, the NASA Program/Project Management Board Charter is available on the Agency Tailoring Web site.

C.3 Resources for Developing the Tailoring Approach

C.3.1 Resources available to programs and projects for developing their tailoring approach are provided on the Agency Tailoring Web site. These resources include:

C.3.2 Tailoring Guidance: Information, various forms of guidance, and implementation plans for developing a program's or project's tailoring approach provided by some requirements owners and Mission Directorates, such as:

a. Guidance provided by "Requirement Owners," including OCE and OCFO, for developing a program's or project's tailoring approach. Examples include general NASA guidance provided in "Guidance and Expectations for Small Category 3, Risk Classification D (Cat3/Class D) Space Flight Projects with Life-Cycle Cost Under $150 Million" and OCFO's MOU template for tailoring a requirement.

b. Guidance from some Mission Directorates for tailoring specific types of projects, such as SMD's Class D Tailoring/Streamlining Decision Memorandum and Class D Tailoring/Streamlining Implementation Plan.

C.3.3 General Overview of Tailoring Approaches: Summary information on tailoring approaches common across multiple programs and projects and requirements that are frequently tailored.

C.3.4 Specific Tailoring Approaches and Examples: Numerous examples of how specific programs and projects have successfully tailored NPR 7120.5 requirements.

C.3.5 Tailoring Tools: Tools to assist programs and projects in developing their tailoring approach have been developed by some Centers. These tools may also be helpful for programs and projects hosted at other Centers.

Approver Acronyms:

EMD Environmental Management Division	OCFO Office of the Chief Financial Officer	OPS Office of Protective Services
FRED Facilities Real Estate Division	OCIO Office of the Chief Information Officer	OSI Office of Strategic Infrastructure
LMD Logistics Management Division	OGC Office of the General Counsel	OSMA Office of Safety and Mission Assurance
OCE Office of the Chief Engineer	OIIR Office of International and Interagency Relations	SID Strategic Investments Division

Table C-1 Compliance Matrix

[Program or Project Name]
(See Section C.1.3 for explanation of notation in Table C-1.
I-Table products marked as "Best Practice" (BP) are not included in the Compliance Matrix.
See Section I.1.d for explanation of "Best Practice".)

Para #	NPR 7120.5 Requirement Statement	Require-ment Owner	Dele-gated	MD AA	CD	PM	Com-ply?	Justification	Approval
2.1.1.2	Regardless of the structure of a program or project meeting the criteria of Section P.2, this NPR shall apply to the full scope of the program or project and all the activities under it.	OCE	No			A			
2.1.3.1	Projects are Category 1, 2, or 3 and shall be assigned to a category based initially on: (1) the project life-cycle cost (LCC) estimate, the inclusion of significant radioactive material, and whether or not the system being developed is for human space flight; and (2) the priority level, which is related to the importance of the activity to NASA, the extent of international participation (or joint effort with other government agencies), the degree of uncertainty surrounding the application of new or untested technologies, and spacecraft/payload development risk classification.	OCE	No	A					
2.1.3.2	For Category 1 projects, the assignment of a project to a Center or implementing organization shall be with the concurrence of the NASA AA.	OCE	No	A					
2.1.4.1	Programs and projects with a LCC or initial capability cost (see Section 2.4.1.3.b) greater than $250M shall be managed by program and project managers who have been certified in compliance with Office of Management and Budget (OMB)'s promulgated Federal acquisition program/project management certification requirements.	OCE	No	A					

2.2.1	Program and project managers shall follow their appropriate life cycle, which includes life-cycle phases; life-cycle gates and major events, including KDPs; major life-cycle reviews (LCRs); principal documents that govern the conduct of each phase; and the process of recycling through Formulation when program changes warrant such action.	OCE	Yes			A			
2.2.2	Program and project managers shall organize the work required for each phase using a product-based WBS developed in accordance with the Program and Project Plan templates (appendices G and H).	OCE	Yes			A			
2.2.3	The documents shown on the life-cycle figures and described below shall be prepared in accordance with the templates in appendices D, E, F, G, and H.	OCE	Yes			A			
2.2.4	Each program and project shall perform the LCRs and KDPs identified in its respective life-cycle figure in accordance with NPR 7123.1, applicable Center practices, and the requirements of this document.	OCE	Yes			A			
2.2.5	Program or project managers and an independent Standing Review Board (SRB) shall conduct the System Requirements Review (SRR), System Definition Review (SDR)/ Mission Definition Review (MDR), Preliminary Design Review (PDR), Critical Design Review (CDR), System Integration Review (SIR), Operational Readiness Review (ORR), and PIR LCRs in figures 2-2, 2-3, 2-4, and 2-5.	OCE	No			A			
2.2.5.1	The Conflict of Interest (COI) procedures detailed in the NASA Standing Review Board Handbook shall be strictly adhered to.	OGC	No	A	A	A			
2.2.5.2	The portion of the LCRs conducted by the SRB shall be convened by the Convening Authorities in accordance with Table 2-2.	OCE	No	A	A	A			
2.2.5.3	The program or project manager, the SRB chair, and the Center Director (or designated Engineering Technical Authority (ETA) representative) shall mutually assess the program's or project's expected readiness for the LCR and report any disagreements to the Decision Authority for final decision.	OCE	No		A	A			
2.2.6	In preparation for these LCRs, the program or project manager shall generate the appropriate documentation per the Appendix I tables of this document, NPR 7123.1, and Center practices, as necessary, to demonstrate that the program's or project's definition and associated plans are sufficiently mature to execute the follow-on phase(s) with acceptable technical, safety, and programmatic risk.	OCE	No			A			
	Table I-1 Uncoupled and Loosely Coupled Program Milestone Products and Control Plans Maturity Matrix								
Table I-1	1. FAD [Baseline at SRR] [Required per NPR 7120.5]	OCE	No	A		A			
Table I-1	2. PCA [Baseline at KDP I] [Required per NPR 7120.5]	OCE	No	A					
Table I-1	3. Program Plan [Baseline at SDR] [Required per NPR 7120.5]	OCE	No	A	A	A			
Table I-1	3.a. Mission Directorate requirements and constraints [Baseline at SRR] [Required per NPR 7123.1]	OCE	Yes	A		A			
Table I-1	3.b. Traceability of program-level requirements on projects to the Agency strategic goals and Mission Directorate requirements and constraints [Baseline at SDR] [Required per NPR 7123.1]	OCE	Yes	A		A			
Table I-1	3.c. Documentation of driving ground rules and assumptions on the program [Baseline at SDR] [Required per NPR 7120.5]	OCE	Yes	A		A			
Table I-1	4. Interagency and international agreements [Baseline at SDR]	OCE	Yes	A		A			
Table I-1	5. ASM Decision Memorandum or ASM meeting summary [additional information in NPD 1000.5]	OCE	Yes	A		A			
Table I-1	6. Risk mitigation plans and resources for significant risks [Required per NPR 7120.5]	OCE	Yes			A			
Table I-1	7. Documented Cost and Schedule Baselines [Baseline at SDR] [Required per NPR 7120.5]	OCFO-SID	No			A			
Table I-1	8. Documentation of Basis of Estimate (cost and schedule) [Baseline at SDR] [Required per NPR 7120.5]	OCFO-SID	No			A			

Table I-1	9. Documentation of performance against plan/baseline, including status/closure of formal actions from previous KDP [Required per NPR 7120.5]	OCE	Yes			A			
Table I-1	10. Industrial Base and Supply Chain Risk Management (SCRM) Strategy and Status [Baseline at SDR] [Required per NPR 8735.2]	OSMA	No			A			
	Program Plan Control Plans								
Table I-1	1. Technical, Schedule, and Cost Control Plan [Baseline at SDR] [Required per NPR 7120.5]	OCE	Yes			A			
Table I-1	2. Safety and Mission Assurance Plan [Baseline at SDR] [Required per NPRs 8705.2 and 8705.4]	OSMA	Yes			A			
Table I-1	3. Risk Management Plan [Baseline at SDR]	OSMA	Yes			A			
Table I-1	4. Acquisition Strategy [Baseline at SDR] [Required per NPD 1000.5]	OCE	Yes			A			
Table I-1	6. Systems Engineering Management Plan [Baseline at SDR] [Required per NPR 7123.1]	OCE	Yes			A			
Table I-1	7. System Security Plan [Baseline at SDR] [Required per NPR 2810.1]	OCIO	No			A			
Table I-1	8. Review Plan [Baseline at SRR] [Required per NPR 7120.5]	OCE	Yes			A			
Table I-1	9. NEPA Compliance Documentation [Baseline at SDR] [Required per NPR 8580.1]	OSI-EMD	No			A			
Table I-1	10. Configuration Management Plan [Baseline at SDR] [Required per NPR 7120.5; additional information in NPR 7123.1 and SAE/EIA 649]	OCE	Yes			A			
Table I-1	11. Security Plan [Baseline at SDR] [Required per NPR 1040.1 and NPR 1600.1]	OPS	No			A			
Table I-1	12. Technology Transfer (formerly Export) Control Plan [Baseline at SDR] [Required per NPR 2190.1]	OIIR	No			A			
Table I-1	15. Quality Assurance Surveillance Plan [Baseline at SDR] [Required per NPR 8735.2 and NASA FAR Supplement part 1837.604]	OSMA	Yes			A			
	Table I-2 Tightly Coupled Program Milestone Products Maturity Matrix								
Table I-2	1. FAD [Baseline at SRR] [Required per NPR 7120.5]	OCE	No	A		A			
Table I-2	2. PCA [Baseline at PDR] [Required per NPR 7120.5]	OCE	No	A					
Table I-2	3. Program Plan [Baseline at SDR] [Required per NPR 7120.5]	OCE	No	A	A	A			
Table I-2	3.a. Mission Directorate requirements and constraints [Baseline at SRR] [Required per NPR 7123.1]	OCE	Yes	A		A			
Table I-2	3.b. Traceability of program-level requirements on projects to the Agency strategic goals and Mission Directorate requirements and constraints [Baseline at SDR] [Required per NPR 7123.1]	OCE	Yes	A		A			
Table I-2	3.c. Documentation of driving ground rules and assumptions on the program [Baseline at SDR] [Required per NPR 7120.5]	OCE	Yes	A		A			
Table I-2	4. Interagency and international agreements [Baseline at SDR]	OCE	Yes	A		A			
Table I-2	5. ASM Decision Memorandum or ASM meeting summary [additional information in NPD 1000.5]	OCE	Yes	A		A			
Table I-2	6. Risk mitigation plans and resources for significant risks [Required per NPR 7120.5]	OCE	Yes			A			
Table I-2	7. Documented Cost and Schedule Baselines [Baseline at PDR] [Required per NPR 7120.5]	OCFO-SID	No			A			
Table I-2	8. Documentation of Basis of Estimate (cost and schedule) [Baseline at PDR] [Required per NPR 7120.5]	OCFO-SID	No			A			
Table I-2	9. CADRe [Baseline at SRR] [Required per NPR 7120.5]	OCFO-SID	No			A			

Table I-2	10. Shared Infrastructure, Staffing, and Scarce Material Requirements and Plans	OCE	Yes			A			
Table I-2	11. Documentation of performance against plan/baseline, including status/closure of formal actions from previous KDP [Required per NPR 7120.5]	OCE	Yes			A			
Table I-2	12. Industrial Base and Supply Chain Risk Management (SCRM) Strategy and Status [Baseline at SDR] [Required per NPR 8735.2]	OSMA	No			A			
	Table I-3 Tightly Coupled Program Plan Control Plans Maturity Matrix								
Table I-3	1. Technical, Schedule, and Cost Control Plan [Baseline at SDR] [Required per NPR 7120.5]	OCE	Yes			A			
Table I-3	2. Safety and Mission Assurance Plan [Baseline at SDR] [Required per NPRs 8705.2 and 8705.4]	OSMA	Yes			A			
Table I-3	3. Risk Management Plan [Baseline at SDR] [Required NPR 8000.4]	OSMA	Yes			A			
Table I-3	4. Acquisition Strategy [Baseline at SDR] [Required per NPD 1000.5]	OCE	Yes			A			
Table I-3	6. Systems Engineering Management Plan [Baseline at SDR] [Required per NPR 7123.1]	OCE	Yes			A			
Table I-3	7. Verification and Validation Plan [Baseline at PDR] [Required per NPR 7120.5, additional information in NPR 7123.1]	OCE	Yes			A			
Table I-3	8. System Security Plan [Baseline at CDR] [Required per NPR 2810.1]	OCIO	No			A			
Table I-3	9. Review Plan [Baseline at SRR] [Required per NPR 7120.5]	OCE	Yes			A			
Table I-3	10. Missions Operations Plan [Baseline at ORR] [Required per NPR 7120.5]	OCE	Yes			A			
Table I-3	11. NEPA Compliance Documentation [Baseline at PDR] [Required per NPR 8580.1]	OSI-EMD	No			A			
Table I-3	12. Integrated Logistics Support Plan [Baseline at PDR] [Required per NPD 7500.1]	OSI-LMD	No			A			
Table I-3	14. Configuration Management Plan [Baseline at SDR] [Required per NPR 7120.5; additional information in NPR 7123.1 and SAE/EIA 649]	OCE	Yes			A			
Table I-3	15. Security Plan [Baseline at PDR] [Required per NPR 1040.1 and NPR 1600.1]	OPS	No			A			
Table I-3	16. Technology Transfer (formerly Export) Control Plan [Baseline at PDR] [Required per NPR 2190.1]	OIIR	No			A			
Table I-3	19. Human Rating Certification Package [Initial at SRR; certified at MRR/FRR] [Required per NPR 8705.2]	OSMA	No			A			
Table I-3	20. Quality Assurance Surveillance Plan [Baseline at SDR] [Required per NPR 8735.2 and NASA FAR Supplement part 1837.604]	OSMA	Yes			A			
Table I-3	21. Orbital Collision Avoidance Plan [Baseline at PDR] [Required per NID 7120.132]	OCE	No			A			
Table I-3	22. Human Systems Integration Plan [Baseline at SRR] [additional information in NASA/SP-20210010952 NASA HSI Handbook and NPR 7123.1]	OCE-OSMA-OCHMO1	No			A			
	Table I-4 Project Milestone Products Maturity Matrix								
	Headquarters and Program Products								
Table I-4	1. FAD [Baseline at MCR] [Required per NPR 7120.5]	OCE	No	A		A			
Table I-4	2. Program Plan [Baseline at MCR] [Required per NPR 7120.5]	OCE	No	A		A			
Table I-4	2.a. Applicable Agency strategic goals [Baseline at MCR] [Required per NPR 7123.1]	OCE	Yes	A		A			
Table I-4	2.b. Documentation of program-level requirements and constraints on the project (from the Program Plan) and stakeholder expectations, including mission objectives/goals and mission success criteria [Baseline at SRR] [Required per NPR 7123.1]	OCE	Yes	A		A			

Table I-4	2.c. Documentation of driving mission, technical, and programmatic ground rules and assumptions [Baseline at SDR/MDR] [Required per NPR 7120.5]	OCE	Yes	A		A			
Table I-4	3. Partnerships and interagency and international agreements [Baseline U.S. partnerships and agreements at SDR/MDR; Baseline International agreements at PDR]	OCE	Yes	A		A			
Table I-4	4. ASM Decision Memorandum or ASM meeting summary [additional information in NPD 1000.5]	OCE	Yes	A		A			
Table I-4	5. Mishap Preparedness and Contingency Plan [Baseline at SMSR] [Required per NPR 8621.1]	OSMA	Yes	A		A			
	Project Technical Products								
Table I-4	1. Concept Documentation [Approve at MCR] [Required per NPR 7123.1]	OCE	Yes			A			
Table I-4	2. Mission, Spacecraft, Ground, and Payload Architectures [Baseline mission and spacecraft architecture at SRR; Baseline ground and payload architectures at SDR/MDR] [Required per NPR 7123.1]	OCE	Yes			A			
Table I-4	3. Project-Level, System, and Subsystem Requirements [Baseline project-level and system-level requirements at SRR; Baseline subsystem requirements at PDR] [Required per NPR 7123.1]	OCE	Yes			A			
Table I-4	4. Design Documentation [Baseline at CDR] [Required per NPR 7123.1]	OCE	Yes			A			
Table I-4	5. Operations Concept Documentation [Baseline at PDR] [Required per NPR 7120.5]	OCE	Yes			A			
Table I-4	6. Technology Readiness Assessment Documentation [Required per NPR 7120.5 Appendix F FA Template]	OCE	Yes			A			
Table I-4	7. Engineering Development Assessment Documentation [Required per NPR 7120.5 Appendix F FA Template]	OCE	Yes			A			
Table I-4	8. Heritage Assessment Documentation [Required per NPR 7120.5 Appendix F FA Template]	OCE	Yes			A			
Table I-4	9. Systems Safety Analyses (e.g., safety data packages) [Baseline at CDR] [Required per NPR 8715.3]	OSMA	Yes			A			
Table I-4	10. Payload Safety Process Deliverables [Baseline at SIR] [Required per NPR 8715.7]	OSMA	Yes			A			
Table I-4	11. Verification and Validation Report [Baseline at MRR/FRR] [Required per NPR 7123.1]	OCE	Yes			A			
Table I-4	12. Operations Handbook [Baseline at ORR] [additional information in NPR 7120.5 Appendix A]	OCE	Yes			A			
Table I-4	13. Orbital Debris Assessment Report [Final at SMSR] [Required per NPR 8715.6]	OSMA	No	A		A			
Table I-4	14. End of Mission Plans [Baseline at SMSR] [Required per NPR 8715.6; additional information in NASA-STD-8719.14, App B]	OSMA	Yes	A		A			
Table I-4	16. Decommissioning/Disposal Plan [Baseline at DR] [Required per NPR 7123.1]	OCE	Yes			A			
Table I-4	17. Industrial Base and Supply Chain Risk Management (SCRM) Strategy and Status [Baseline at PDR] [Required per NPR 8735.2]	OSMA	No			A			
Table I-4	18. Criticality Identification Method for Hardware [Baseline at PDR] [Required per NPR 8735.2]	OSMA	No			A			
	Project Management, Planning, and Control Products								
Table I-4	1. Formulation Agreement [Baseline for Phase A at MCR; Baseline for Phase B at SDR/MDR] [Required per NPR 7120.5]	OCE	Yes	A	A	A			
Table I-4	2. Project Plan [Baseline at PDR] [Required per NPR 7120.5]	OCE	Yes	A	A	A			
Table I-4	3. Documentation of performance against Formulation Agreement (see #1 above) or against plans for work to be accomplished during Implementation life-cycle phase, including performance against baselines and status/closure of formal actions from previous KDP [Required per NPR 7120.5]	OCE	Yes			A			
Table I-4	4. Project Baselines [Baseline at PDR]	N/A	N/A						

Table I-4	4.a. Top technical, cost, schedule and safety risks, risk mitigation plans, and associated resources [Required per NPR 7120.5]	OCE	Yes			A			
Table I-4	4.b. Staffing requirements and plans [Required per NPR 7120.5]	OCE	Yes			A			
Table I-4	4c.i. Infrastructure requirements and plans [Required per NPR 9250.1, NPD 8800.14, and NPR 8820.2] Business case analysis for infrastructure [Required per NPR 8800.15.]	OSI-FRED	No			A			
Table I-4	4.c.ii. Capitalization Determination Form (CDF) (NASA Form 1739) [Required per NPR 9250.1]	OCFO	No			A			
Table I-4	4.d. Schedule [Baseline Integrated Master Schedule at PDR] [Required per NPR 7120.5]	OCFO-SID	No			A			
Table I-4	4.e. Cost Estimate [Baseline at PDR] [Required per NPR 7120.5]	OCFO-SID	No			A			
Table I-4	4.f. Basis of Estimate (cost and schedule) [Required per NPR 7120.5]	OCFO-SID	No			A			
Table I-4	4.g. Confidence Level(s) and supporting documentation [Baseline at PDR] [Required per NPR 7120.5]	OCFO-SID	No			A			
Table I-4	4.h. External Cost and Schedule Commitments [Baseline at PDR] [Required per NPR 7120.5]	OCFO-SID	No	A		A			
Table I-4	4.i. CADRe [Baseline at SRR] [Required per NPR 7120.5]	OCFO-SID	No			A			
Table I-4	4.j. PMB [Baseline at PDR] [Required per NPR 7120.5]	OCFO-SID	No			A			
	Table I-5 Project Plan Control Plans Maturity Matrix								
Table I-5	1. Technical, Schedule, and Cost Control Plan [Baseline at SDR/MDR] [Required per NPR 7120.5]	OCE	Yes			A			
Table I-5	2. Safety and Mission Assurance Plan [Baseline at SRR] [Required per NPRs 8705.2 and 8705.4]	OSMA	Yes			A			
Table I-5	3. Risk Management Plan [Baseline at SRR] [Required per NPR 8000.4]	OSMA	Yes			A			
Table I-5	4. Acquisition Strategy [Baseline at SRR] [Required per NPD 1000.5]	OCE	Yes			A			
Table I-5	6. Systems Engineering Management Plan [Baseline at SRR] [Required per NPR 7123.1]	OCE	Yes			A			
Table I-5	7. System Security Plan [Baseline at CDR] [Required per NPR 2810.1]	OCIO	No			A			
Table I-5	8. Software Management Plan(s) [Baseline at SDR/MDR] [Required per NPR 7150.2; additional information in NASA-STD-8739.8]	OCE	No			A			
Table I-5	9. Verification and Validation Plan [Baseline at PDR] [Required per NPR 7120.5, additional information in NPR 7123.1]	OCE	Yes			A			
Table I-5	10. Review Plan [Baseline at SRR] [Required per NPR 7120.5]	OCE	Yes			A			
Table I-5	11. Mission Operations Plan [Baseline at ORR] [Required per NPR 7120.5]	OCE	Yes			A			
Table I-5	12. NEPA Compliance Documentation [Baseline at SDR/MDR] [Required per NPR 8580.1]	OSI-EMD	No			A			
Table I-5	13. Integrated Logistics Support Plan [Baseline at PDR] [Required per NPD 7500.1]	OSI-LMD	No			A			
Table I-5	15. Integration Plan [Baseline at PDR] [Required per NPR 7120.5]	OCE	Yes			A			
Table I-5	16. Configuration Management Plan [Baseline at SRR] [Required per NPR 7120.5; additional information in NPR 7123.1 and SAE/EIA 649]	OCE	Yes			A			
Table I-5	17. Security Plan [Baseline at PDR] [Required per NPR 1040.1 and NPR 1600.1]	OPS	No			A			
Table I-5	18. Project Protection Plan [Baseline at PDR] [Required per NPR 1058.1; additional information in NASA-STD-1006]	OCE	No			A			

Table I-5	19. Technology Transfer (formerly Export) Control Plan [Baseline at PDR] [Required per NPR 2190.1]	OIIR	No			A			
Table I-5	21. Human Rating Certification Package [Initial at SRR; certified at MRR/FRR] [Required per NPR 8705.2]	OSMA	No			A			
Table I-5	22. Planetary Protection Plan [Baseline at PDR] [Required per NPD 8020.7 and NPR 8020.12]	OSMA	No			A			
Table I-5	23. Nuclear Launch Authorization Plan [Baseline at SDR/MDR] [additional information in NPR 8715.3]	OSMA	No			A			
Table I-5	24. Range Safety Risk Management Process Documentation [Baseline at SIR] [Required per NPR 8715.5]	OSMA	Yes			A			
Table I-5	26. Quality Assurance Surveillance Plan [Baseline at SDR] [Required per NPR 8735.2 and NASA FAR Supplement part 1837.604]	OSMA	Yes			A			
Table I-5	27. Orbital Collision Avoidance Plan [Baseline at PDR] [Required per NID 7120.132]	OCE	No			A			
Table I-5	28. Human Systems Integration Plan [Baseline at SRR] [additional information in NASA/SP-20210010952 NASA HSI Handbook and NPR 7123.1]	OCE-OSMA-OCHMO1	No			A			
	Table I-6 Single-Project Program Milestone Products Maturity Matrix								
Table I-6	1. FAD [Baseline at MCR] [Required per NPR 7120.5]	OCE	No	A		A			
Table I-6	2. PCA [Baseline at PDR] [Required per NPR 7120.5]	OCE	No	A					
Table I-6	3. Traceability of Agency strategic goals and Mission Directorate requirements and constraints to program/project-level requirements and constraints [Baseline at SRR] [Required per NPR 7123.1]	OCE	Yes	A		A			
Table I-6	4. Documentation of driving mission, technical, and programmatic ground rules and assumptions [Baseline at SDR/MDR] [Required per NPR 7120.5]	OCE	Yes	A		A			
Table I-6	5. Partnerships and inter-agency and international agreements [Baseline U.S. partnerships and agreements at SDR/MDR; Baseline international agreements at PDR]	OCE	Yes	A		A			
Table I-6	6. ASM Decision Memorandum or ASM meeting summary [additional information in NPD 1000.5]	OCE	Yes	A		A			
Table I-6	7. Mishap Preparedness and Contingency Plan [Baseline at SMSR] [Required per NPR 8621.1]	OSMA	Yes	A		A			
	Single-Project Program Technical Products								
Table I-6	1. Concept Documentation [Required per NPR 7123.1]	OCE	Yes			A			
Table I-6	2. Mission, Spacecraft, Ground, and Payload Architectures [Baseline mission and spacecraft architecture at SRR; baseline ground and payload architectures at SDR/MDR] [Required per NPR 7123.1]	OCE	Yes			A			
Table I-6	3. Project-Level, System, and Subsystem Requirements [Baseline project-level and system-level requirements at SRR; baseline subsystem requirements at PDR] [Required per NPR 7123.1]	OCE	Yes			A			
Table I-6	4. Design Documentation [Baseline at CDR] [Required per NPR 7123.1]	OCE	Yes			A			
Table I-6	5. Operations Concept Documentation [Baseline at PDR] [Required per NPR 7120.5]	OCE	Yes			A			
Table I-6	6. Technology Readiness Assessment Documentation [Required per NPR 7120.5 Appendix F FA Template]	OCE	Yes			A			
Table I-6	7. Engineering Development Assessment Documentation [Required per NPR 7120.5 Appendix F FA Template]	OCE	Yes			A			
Table I-6	8. Heritage Assessment Documentation [Required per NPR 7120.5 Appendix F FA Template]	OCE	Yes			A			
Table I-6	9. Systems Safety Analyses (e.g., safety data packages) [Baseline at CDR] [Required per NPR 8715.3]	OSMA	Yes			A			
Table I-6	10. Payload Safety Process Deliverables [Baseline at SIR] [Required per NPR 8715.7]	OSMA	Yes			A			

Table I-6	11. Verification and Validation Report [Baseline at MRR/FRR] [Required per NPR 7123.1]	OCE	Yes			A			
Table I-6	12. Operations Handbook [Baseline at ORR] [additional information in NPR 7120.5 Appendix A]	OCE	Yes			A			
Table I-6	13. Orbital Debris Assessment Report [Final at SMSR] [Required per NPR 8715.6]	OSMA	No	A		A			
Table I-6	14. End of Mission Plans [Baseline at SMSR] [Required per NPR 8715.6; additional information in NASA-STD-8719.14, App B]	OSMA	Yes	A		A			
Table I-6	16. Decommissioning/Disposal Plan [Baseline at DR] [Required per NPR 7123.1]	OCE	Yes			A			
Table I-6	17. Industrial Base and Supply Chain Risk Management (SCRM) Strategy and Status [Baseline at PDR] [Required per NPR 8735.2]	OSMA	No			A			
Table I-6	18. Criticality Identification Method for Hardware [Baseline at PDR] [Required per NPR 8735.2]	OSMA	No			A			
	Single-Project Program Management, Planning, and Control Products								
Table I-6	1. Formulation Agreement [Baseline for Phase A at MCR; baseline for Phase B at SDR/MDR] [Required per NPR 7120.5]	OCE	Yes	A	A	A			
Table I-6	2. Program Plan [Baseline at PDR] [Required per NPR 7120.5]	OCE	No	A	A	A			
Table I-6	3. Project Plan [Baseline at PDR] [Required per NPR 7120.5]	OCE	Yes	A	A	A			
Table I-6	4. Documentation of performance against Formulation Agreement (see #1 above) or against plans for work to be accomplished during Implementation life-cycle phase, including performance against baselines and status/closure of formal actions from previous KDP [Required per NPR 7120.5]	OCE	Yes			A			
Table I-6	5. Project Baselines [Baseline at PDR]	N/A	N/A						
Table I-6	5.a. Top technical, cost, schedule and safety risks, risk mitigation plans, and associated resources [Required per NPR 7120.5]	OCE	Yes			A			
Table I-6	5.b. Staffing requirements and plans [Required per NPR 7120.5]	OCE	Yes			A			
Table I-6	5.c.i. Infrastructure requirements and plans [Required per NPR 9250.1, NPD 8800.14, and NPR 8820.2] Business case analysis for infrastructure [Required per NPR 8800.15.]	OSI-FRED	No			A			
Table I-6	5.c.ii. Capitalization Determination Form (CDF) (NASA Form 1739) [Required per NPR 9250.1]	OCFO	No			A			
Table I-6	5.d. Schedule [Baseline Integrated Master Schedule at PDR] [Required per NPR 7120.5]	OCFO-SID	No			A			
Table I-6	5.e. Cost Estimate (Risk-Informed or Schedule-Adjusted Depending on Phase) [Risk-informed and schedule-adjusted baseline at PDR] [Required per NPR 7120.5]	OCFO-SID	No			A			
Table I-6	5.f. Basis of Estimate (cost and schedule) [Required per NPR 7120.5]	OCFO-SID	No			A			
Table I-6	5.g. Confidence Level(s) and supporting documentation [Baseline at PDR] [Required per NPR 7120.5]	OCFO-SID	No			A			
Table I-6	5.h. External Cost and Schedule Commitments [Baseline at PDR] [Required per NPR 7120.5]	OCFO-SID	No	A		A			
Table I-6	5.i. CADRe [Baseline at SRR] [Required per NPR 7120.5]	OCFO-SID	No			A			
Table I-6	5.j. PMB [Baseline at PDR] [Required per NPR 7120.5]	OCFO-SID	No			A			
	Table I-7 Single-Project Program Plan Control Plans Maturity Matrix								
Table I-7	1. Technical, Schedule, and Cost Control Plan [Baseline at SDR/MDR] [Required per NPR 7120.5]	OCE	Yes			A			
Table I-7	2. Safety and Mission Assurance Plan [Baseline at SRR] [Required per NPRs 8705.2 and 8705.4]	OSMA	Yes			A			

Table I-7	3. Risk Management Plan [Baseline at SRR] [Required per NPR 8000.4]	OSMA	Yes			A			
Table I-7	4. Acquisition Strategy [Baseline at SRR] [Required per NPD 1000.5]	OCE	Yes			A			
Table I-7	6. Systems Engineering Management Plan [Baseline at SRR] [per NPR 7123.1]	OCE	Yes			A			
Table I-7	7. System Security Plan [Baseline at CDR] [Required per NPR 2810.1]	OCIO	No			A			
Table I-7	8. Software Management Plan(s) [Baseline at SDR/MDR] [Required per NPR 7150.2; additional information in NASA-STD-8739.8]	OCE	No			A			
Table I-7	9. Verification and Validation Plan [Baseline at PDR] [Required per NPR 7120.5, additional information in NPR 7123.1	OCE	Yes			A			
Table I-7	10. Review Plan [Baseline at SRR] [Required per NPR 7120.5]	OCE	Yes			A			
Table I-7	11. Mission Operations Plan [Baseline at ORR] [Required per NPR 7120.5]	OCE	Yes			A			
Table I-7	12. NEPA Compliance Documentation [Baseline at SDR/MDR] [Required per NPR 8580.1]	OSI-EMD	No			A			
Table I-7	13. Integrated Logistics Support Plan [Baseline at PDR] [Required per NPD 7500.1]	OSI-LMD	No			A			
Table I-7	15. Integration Plan [Baseline at PDR] [Required per NPR 7120.5]	OCE	Yes			A			
Table I-7	16. Configuration Management Plan [Baseline at SRR] [Required per NPR 7120.5; additional information in NPR 7123.1 and SAE/EIA 649]	OCE	Yes			A			
Table I-7	17. Security Plan [Baseline at PDR] [Required per NPR 1040.1 and NPR 1600.1]	OPS	No			A			
Table I-7	18. Project Protection Plan [Baseline at PDR] [Required per NPR 1058.1; additional information in NASA-STD-1006]	OCE	No			A			
Table I-7	19. Technology Transfer (formerly Export) Control Plan [Baseline at PDR] [Required per NPR 2190.1]	OIIR	No			A			
Table I-7	21. Human Rating Certification Package [Initial at SRR; certified at MRR/FRR] [Required per NPR 8705.2]	OSMA	No			A			
Table I-7	22. Planetary Protection Plan [Baseline at PDR] [Required per NPD 8020.7 and NPR 8020.12]	OSMA	No			A			
Table I-7	23. Nuclear Launch Authorization Plan [Baseline at SDR/MDR] [additional information in NPR 8715.3]	OSMA	No			A			
Table I-7	24. Range Safety Risk Management Process Documentation [Baseline at SIR] [Required per NPR 8715.5]	OSMA	Yes			A			
Table I-7	26. Quality Assurance Surveillance Plan [Baseline at SDR] [Required per NPR 8735.2 and NASA FAR Supplement part 1837.604]	OSMA	Yes			A			
Table I-7	27. Orbital Collision Avoidance Plan [Baseline at PDR] [Required per NID 7120.132]	OCE	No			A			
Table I-7	28. Human Systems Integration Plan [Baseline at SRR] [additional information in NASA/SP-20210010952 NASA HSI Handbook and NPR 7123.1]	OCE-OSMA-OCHMO1	No			A			
2.2.8	Projects, single-project programs (and other programs at the discretion of the MDAA) with a life-cycle cost (LCC) or initial capability cost (see Section 2.4.1.3.b) estimated to be greater than $250M shall perform earned value management (EVM) and comply with EIA-748, Standard for Earned Value Management Systems for all portions of work including in-house and contracted portions of the project.	OCFO-SID	No	A		A			
2.2.8.1	Program and project managers with programs and projects subject to EVM shall utilize the NASA EVM Capability Process for in-house work.	OCFO-SID	No			A			
2.2.8.2	EVM system requirements for contracted work shall be applied to suppliers in accordance with the NASA Federal Acquisition Regulation (FAR) Supplement, independent of phase and the $250M threshold (https://www.hq.nasa.gov/office/procurement/regs/NFS.pdf.).	OCFO-SID	No	A		A			

2.2.8.3	Mission Directorates shall conduct an IBR in preparation for KDP C and for major changes that significantly impact the cost and schedule baseline.	OCFO-SID	No	A		A			
2.2.8.4	EVMS surveillance shall be conducted on contracts and programs and projects with in-house work to ensure continued compliance with EIA-748, Standard for Earned Value Management Systems.	OCFO-SID	No	A		A			
2.2.10	Program and project managers shall complete and maintain a Compliance Matrix (see Appendix C) for this NPR and attach it to the Formulation Agreement for projects in Formulation and/or the Program or Project Plan.	OCE	No			A			
2.2.11	Single-project programs and projects shall develop a Project Protection Plan that addresses NASA-STD-1006, Space System Protection Standard in accordance with NPR 1058.1, Enterprise Protection Program.	OCE	No			A			
2.3.1	Each program and project shall have a Decision Authority the Agency's responsible individual who determines whether and how the program or project proceeds through the life cycle and the key program or project cost, schedule, and content parameters that govern the remaining life-cycle activities.	OCE	No	A					
2.3.1.1	The MDAA shall inform the NASA AA and Administrator via email on all Agency Baseline Commitments (ABCs) per the following: inform the NASA AA on ABCs for single-project programs and projects with a LCC or initial capability cost (see Section 2.4.1.3.b) greater than $250M; and inform the NASA Administrator on ABCs for all single-project programs and projects with a LCC or initial capability cost greater than $1B and all Category 1 projects. (See Section 2.4.1.5 for more information on ABCs.)	OCE	No	A					
2.3.2	Each program and project shall have a governing PMC.	OCE	No	A					
2.3.4	The Center Director (or designee) shall oversee programs and projects usually through the CMC, which monitors and evaluates all program and project work (regardless of category) executed at that Center.	OCE	No		A				
2.3.5	Following each LCR, the independent SRB chair and the program or project manager shall brief the applicable management councils on the results of the LCR to support the councils' assessments.	OCE	No	A	A	A			
2.4.1	The decisions by the Decision Authority on whether and how the program or project proceeds into the next phase shall be summarized and recorded in the Decision Memorandum signed at the conclusion of the governing PMC by all parties with supporting responsibilities, accepting their respective roles.	OCE	No	A					
2.4.1.1	The Decision Memorandum shall describe the constraints and parameters within which the Agency, the program manager, and the project manager will operate; the extent to which changes in plans may be made without additional approval; any additional actions that came out of the KDP; and the supporting data (i.e., the cost and schedule datasheet) that provide further details.	OCE	No	A		A			
2.4.1.2	A divergence from the Management Agreement that any party identifies as significant shall be accompanied by an amendment to the Decision Memorandum.	OCE	No	A		A			
2.4.1.3	During Formulation, the Decision Memorandum shall establish a target LCC or initial capability cost range (and schedule range, if applicable) as well as the Management Agreement addressing the schedule and resources required to complete Formulation.	OCFO-SID	No	A		A			
2.4.1.3 a	For single-project programs and projects with a LCC or initial capability cost greater than or equal to $1B, the Decision Memorandum shall establish a high and low value for cost and schedule with the corresponding JCL value at KDP B.	OCFO-SID	No	A		A			
2.4.1.5	All single-project program managers and project managers shall document the Agency's LCC estimate or initial capability cost estimate and other parameters in the Decision Memorandum for Implementation (KDP C), and this becomes the ABC.	OCFO-SID	No	A		A			
2.4.1.5.a	For all single-project programs and projects with a definite Phase E end point, the Agency's LCC estimate and other parameters shall become the ABC.	OCFO-SID	No	A		A			

2.4.1.5.b	For single-project programs and projects that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point, the initial capability cost estimate and other parameters shall become the ABC.	OCFO-SID	No	A		A			
2.4.1.7	Tightly coupled programs shall document their LCC estimate in accordance with the scope defined in the FAD or PCA, and other parameters in their Decision Memorandum at KDP I and update it at subsequent KDPs.	OCFO-SID	No	A		A			
2.4.1.8	Programs or projects shall be rebaselined when: (1) the estimated development cost exceeds the ABC development cost by 30 percent or more (for projects over $250M, also that Congress has reauthorized the project); (2) the NASA AA judges that events external to the Agency make a rebaseline appropriate; or (3) the NASA AA judges that the program or project scope defined in the ABC has been changed or the project has been interrupted.	OCFO-SID	No	A		A			
2.4.2	The program or project shall document the basis of estimate (BOE) for cost estimates and planned schedules in retrievable program or project records.	OCFO-SID	No			A			
2.4.3.1 a.	Single-project programs with an estimated LCC under $1B and projects with an estimated LCC greater than $250M and under $1B shall provide a range of cost and a range for schedule, each range (with confidence levels identified for the low and high values of the range) established by a probabilistic analysis and based on identified resources and associated uncertainties by fiscal year.	OCFO-SID	No			A			
2.4.3.1 b.	Single-project programs and projects with an estimated LCC greater than or equal to $1B shall develop a JCL and provide a high and low value for cost and schedule with the corresponding JCL value (e.g., 50 percent, 70 percent).	OCFO-SID	No			A			
2.4.3.2	At KDP C, single-project programs (regardless of LCC) and projects with an estimated LCC greater than $250M shall develop a cost-loaded schedule and perform a risk-informed probabilistic analysis that produces a JCL.	OCFO-SID	No			A			
2.4.3.3	At CDR, single-project programs and projects with an estimated LCC greater than or equal to $1B shall update their KDP C JCL and communicate the updated JCL values for the ABC and Management Agreement to the APMC for informational purposes.	OCFO-SID	No			A			
2.4.3.4	At KDP D, single-project programs and projects with an estimated LCC greater than or equal to $1B shall update their JCL if current reported development costs have exceeded the development ABC cost by 5 percent or more and document the updated JCL values for the ABC and Management Agreement in the KDP D Decision Memorandum.	OCFO-SID	No			A			
2.4.3.5	When a single-project program (regardless of LCC) or project with an estimated LCC greater than $250M is rebaselined, a JCL shall be calculated and evaluated as a part of the rebaselining approval process.	OCFO-SID	No	A		A			
2.4.4.1	At KDP B, Mission Directorates shall plan and budget single-project programs and projects with an estimated LCC greater than or equal to $1B based on a 70 percent JCL or as approved by the Decision Authority.	OCFO-SID	No	A					
2.4.4.2	At KDP C, Mission Directorates shall plan and budget single-project programs (regardless of LCC) and projects with an estimated LCC greater than $250M based on a 70 percent JCL or as approved by the Decision Authority.	OCFO-SID	No	A					
2.4.4.3	At KDP B and KDP C, any JCL approved by the Decision Authority at less than 70 percent shall be justified and documented in a Decision Memorandum.	OCFO-SID	No	A					
2.4.4.4	At KDP C, Mission Directorates shall ensure funding for single-project programs (regardless of LCC) and projects with an estimated LCC greater than $250M is consistent with the Management Agreement and in no case less than the equivalent of a 50 percent JCL or as approved by the Decision Authority.	OCFO-SID	No	A					
2.4.4.5	At KDP C, any funding approved by the Decision Authority that is inconsistent with the Management Agreement or less than 50 percent JCL shall be justified and documented in a Decision Memorandum.	OCFO-SID	No	A					

2.4.5	Tightly coupled, loosely coupled, and uncoupled programs shall provide analysis of the program's risk posture to the governing PMC as each new project reaches KDP B and C or when a project's ABC is rebaselined.	OCFO-SID	No	A		A			
3.3.1	Programs and projects shall follow the Technical Authority (TA) process established in this Section 3.3.	OCE	No	A	A	A			
3.4.1	Programs and projects shall follow the Formal Dissent process in this Section 3.4.	OCE	No	A	A	A			
3.5.1	Programs and projects shall follow the tailoring process in this Section 3.5.	OCE	No	A	A	A			
3.5.5	A request for a permanent change to a prescribed requirement in an Agency or Center document that is applicable to all programs and projects shall be submitted as a "change request" to the office responsible for the requirement policy document unless formally delegated elsewhere.	OCE	No	A	A	A			
3.6.1	Center Directors negotiating reimbursable space flight work with another agency shall propose NPR 7120.5 as the basis by which it will perform the space flight work.	OCE	No		A				
3.7.1	Each program and project shall perform and document an assessment to determine an approach that maximizes the use of SI.	OCE	No			A			
1 The Human Systems Integration Plan requirement is owned by the three TA offices OCHMO, OCE and OSMA. OCE is the POC for this requirement and will coordinate verifications and relief from requirements with all TAs as necessary.									

STUFF

Appendix D. Program Commitment Agreement Template

D.1 PCA Title Page

Program Commitment Agreement

(Provide a title for the candidate program and designate a short title or proposed acronym in parenthesis, if appropriate.)
It is the responsibility of each of the signing parties to notify the other in the event that a commitment cannot be met and to initiate the timely renegotiations of the terms of this agreement.

_____ _____
Mission Directorate Associate Administrator Date

_____ _____
Associate Administrator Date

By signing this document, signatories are certifying that the content herein is acceptable as direction for managing this program and that they will ensure its implementation by those over whom they have authority.

Figure D-1 Program Commitment Agreement Title Page

D.2 PCA Template

PROGRAM COMMITMENT AGREEMENT
(PROGRAM TITLE)

1.0 PROGRAM OBJECTIVES

Identify the broad program objectives. Describe the program's relationship to Mission Directorate goals and objectives as documented in the Directorate's plan. Convey the public good of the program to the taxpayer, stated in a way that can be understood by the average citizen.

2.0 PROGRAM OVERVIEW

Describe the strategy to achieve the above-mentioned objectives. Relationships with external organizations, other agencies, or international partners should be addressed if achievement of the program objectives is dependent on their performance. Identify the associated projects to be included in the program as of the writing date. Specify the type of program (i.e., single-project, uncoupled, loosely coupled, or tightly coupled) and the basis for that classification.

Specify if there are plans for continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point, for:

• Each project

• Single-project programs

For such programs and projects, define the scope of the initial capability.

3.0 PROGRAM AUTHORITY

Describe the NASA organizational structure for managing the program and projects from the MDAA to the NASA Center project managers. Include lines of authority and reporting, and Center(s) responsibilities. Specifically identify the Decision Authority and governing Program Management Council (PMC) for oversight of the program, and any delegated Decision Authority and delegated governing PMC, per Section 2.3 of this NPR.

Document each project's Decision Authority and governing PMC or identify where this information is documented.

Identify the approving official for new projects.

4.0 TECHNICAL PERFORMANCE COMMITMENT

Summarize the technical performance requirements, identifying baselines and thresholds needed to achieve the program objectives, as applicable. If the objectives include a technical performance target (goal) in addition to a threshold requirement, the commitment could be stated as a range. Demonstrate traceability to Agency strategic goals, outcomes, and requirements.

5.0 SCHEDULE COMMITMENT

Identify the following key target milestones for each project in the program, such as:

1. Start of Formulation.

2. Target date or timeframe for the SDR or MDR.

3. Target date or timeframe for the PDR or the start of implementation.

4. Start of initial capability (for single-project programs and projects that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point).

5. Start of operations.

6. End of prime operations and/or disposal, if applicable.

7. Other milestones or time periods, as appropriate, for a specific program/project.

6.0 COST COMMITMENT

Provide the estimated cost range for the program for the ten-year period beginning in the current fiscal year at a level of detail that identifies the approved individual projects. Identify the constraints and assumptions used to develop this estimated cost range and specifically identify those assumptions that drive the range. This cost range should contain all costs necessary to perform the program, including, but not limited to, customary project activities, required technology developments, facilities costs, launch vehicles, tracking, operations and sustainment, data analysis, and disposal. Either reference the most recent Agency budget to provide the first five years of the estimated program cost or provide the budget required for the next five years. The cost range should be updated when program content changes, such as the addition of new projects entering Implementation or when the estimated cost changes. Reference the annual budget contained in the Integrated Budget and Performance Document (IBPD) for cost phasing.

7.0 ACQUISITION STRATEGY

Provide a high-level summary of the Acquisition Strategy (described in Appendix G, Section 3.4) to reflect the results of the process for acquisition and the Acquisition Strategy Meeting (ASM).

8.0 HIGH-RISK AREAS

Identify the areas of highest risk for the program (covering safety, technical, institutional, cost, and schedule issues) in which failure may result in changes to the program/project baseline cost, schedule, safety, or technical performance requirements. This section should identify, where possible, the specific risk drivers, such as high-risk technologies upon which the program is dependent, and mitigation options.

9.0 INTERNAL AGREEMENTS

If the program is dependent on other NASA activities outside of the MDAA’s control to meet program objectives, identify the required support and list any formal agreements required.

10.0 EXTERNAL AGREEMENTS

Explain the involvement of external organizations, other agencies, or international support necessary to meet the program objectives. Include a brief overview of the program/project relationships with such external organizations. Include an identification of the commitments being made by the external organizations, other agencies, or international partners and a listing of the specific agreements to be concluded. Any unique considerations affecting implementation of required NASA policies and processes necessitated by the external involvement should be clearly identified, such as commercial or other partners that will develop end products that are not owned by NASA but are provided as services to NASA.

11.0 REVIEWS

Specify the program and project life-cycle reviews (per figures 2-2, 2-3, 2-4, and 2-5 in

Chapter 2) that are required to be conducted during the Implementation Phase. Include any other requirements (e.g., the ASM) and any known unique considerations (e.g., innovative acquisition approaches, international participation). Identify the tailoring to accommodate aspects of innovative acquisition approaches and when the tailoring approach will be defined. Specify the considerations that will be used to trigger a discussion on the need for a PIR with the NASA AA (see Section 2.2.4.2 and Considerations for a PIR in Appendix A.)

12.0 OUTCOMES

Identify the discrete set of expected deliverables (outcomes) that flow from the Agency goals and objectives, as defined in the Agency Strategic Plan.

13.0 WAIVERS AND DEVIATIONS

Identify known waivers or deviations that will be sought for the program. Provide a rationale consistent with program characteristics such as scope, complexity, visibility, cost, safety, and acceptable risk.

14.0 PCA ACTIVITIES LOG

Provide and maintain a log of all PCA activities, including revisions that reflect all waivers to the original PCA. This log includes the information shown in Table D-1 and may be supplemented with an attached addendum for each change, describing the change. The PCA should be updated to add approved projects or whenever substantial change makes it necessary. The PCA should be revalidated or updated at each KDP.

Table D-1 Sample Program Commitment Agreement Activities Log

				Termination	**MDAA**	**Associate Administrator**
Date	Event	Change	Addendum	Review Req'd	Signature	Signature
dd/mm/yy	Revalidation	None	N/A	No		
dd/mm/yy	Revalidation	None	N/A	No		
dd/mm/yy	Approval of new project	Addition of Project N	Ref. #1	No		

Appendix E. Formulation Authorization Document Template

E.1 Program FAD Title Page

[*Program Name*] Formulation Authorization Document

[*short title or acronym*]

(Provide a title for the candidate program and designate a short title or proposed acronym in parenthesis, if appropriate.)

_____	_____
Mission Directorate Associate Administrator	Date
_____	_____
Program Manager	Date
_____	_____
Associate Administrator	Date

By signing this document, signatories are certifying that the content herein is acceptable as direction for managing this program and that they will ensure its implementation by those over whom they have authority.

Figure E-1 Program Formulation Authorization Document Title Page

E.2 Project FAD Title Page

[*Project Name*] Formulation Authorization Document

[*short title or acronym*]

(Provide a title for the candidate project and designate a short title or proposed acronym in parenthesis, if appropriate.)

_____ _____

Mission Directorate Associate Administrator Date

_____ _____

Program Manager Date

By signing this document, signatories are certifying that the content herein is acceptable as direction for managing this project and that they will ensure its implementation by those over whom they have authority.

Figure E-2 Project Formulation Authorization Document Title Page

E.3 Program/Project FAD Template

[Program/Project Name] Formulation Authorization Document
[short title or acronym]

1.0 PURPOSE

Describe the purpose of the program/project, including a clear traceability from the goals and objectives in the Mission Directorate Strategies or Program Plan, as applicable. This need is independent of any particular technological solution and is stated in terms of functional capabilities.

2.0 AUTHORITY

Describe the NASA organizational structure for managing the Formulation process from the Mission Directorate Associate Administrator (MDAA) to the NASA Center program/project managers, as applicable. Include lines of authority, coordination, and reporting. For projects and single-project programs, the Formulation Authorization Agreement (FAD) provides the basis for the project's Formulation Agreement. Specifically identify the Decision Authority and the governing Program Management Council (PMC) for oversight of the program/project, per Section 2.3 of this NPR.

3.0 PROGRAM TYPE/PROJECT CATEGORY

For programs, identify the program type (uncoupled, loosely coupled, tightly coupled, single-project). The MDAA determines the type of program with concurrence from the NASA AA. For projects, identify the project category (Category 1, 2, or 3).

4.0 PROGRAM/PROJECT GOALS AND OBJECTIVES

Describe the level or scope of work, goals, and objectives to be accomplished in the Formulation Phase, Formulation cost targets and constraints, the time available, and any other constraints.

5.0 INTERNAL PARTICIPANTS

Identify Mission Directorates, mission support offices, and Centers to be involved in the activity, their scope of work, and any known constraints related to their efforts (e.g., the program/project will be co-funded by a different Mission Directorate).

6.0 EXTERNAL PARTICIPANTS

Identify participation external to NASA to be involved in the activity, their scope of work, and any known constraints related to their efforts (e.g., the program/project will be co-funded by the external participant; commercial or other partners that will develop end products that are not owned by NASA, but are provided as services to NASA; etc.).

7.0 BUDGET AND COST ESTIMATE

Identify, by fiscal year, the funding that will be committed to the program/project during each year of Formulation. If the Formulation period is less than five years, provide estimated annual costs for five years. For projects, provide an estimated life-cycle or initial capability cost range that is consistent with this five fiscal-year cost runout.

8.0 SCHEDULE

For each project, provide the planned date for the completion of Phase A and estimated completion of Phase B. Provide an estimated date (or range) for the completion of project development. Specify the planned prime operations period.

9.0 LIFE-CYCLE REVIEWS

Specify the program and project life-cycle reviews (per figures 2-2, 2-3, 2-4, and 2-5 in Chapter 2 of this NPR) that are required to be conducted during the Formulation Phase. Include any other requirements (e.g., the Pre-ASM, ASM) and any known unique considerations (e.g., innovative acquisition approaches (see Section 2.2.4.1), international participation). Identify tailoring to accommodate aspects of innovative acquisition approaches and when the tailoring approach will be defined.

Appendix F. Project Formulation Agreement Template

F.1 Formulation Agreement Template Instructions

F.1.1 The Formulation Agreement represents the project's or single-project program's response to the Formulation Authorization Document. (See Appendix E.) It establishes technical and acquisition work that needs to be conducted during Formulation and defines the schedule and funding requirements during Phase A and Phase B for that work. The Agreement focuses on the project or single-project program activities necessary to accurately characterize the complexity and scope of the project or single-project program; increase understanding of requirements; and identify and mitigate high technical, acquisition, safety, cost, and schedule risks. It identifies and prioritizes the Phase A and Phase B technical and acquisition work that will have the most value and enables the project or single-project program to develop high-fidelity cost and schedule range estimates or high and low values for cost and schedule with the corresponding JCL values (for projects and single-project programs with a life-cycle or initial capability cost greater than or equal to $1B) at KDP B and high-fidelity cost and schedule commitments at KDP C.

F.1.2 The Formulation Agreement serves as a tool for communicating and negotiating the project's or single-project program's Formulation plans and resource allocations with the program and Mission Directorate. It allows for differences in approach between competed versus assigned missions. Variances with NPR 7120.5 product maturities as documented in Appendix I of NPR 7120.5 are identified with supporting rationale in the Agreement. The approved Agreement serves as authorization for these variances. The Agreement is approved and signed at KDP A and is updated and resubmitted for signature at KDP B. The Formulation Agreement for KDP A includes detailed Phase A information and preliminary Phase B information. The Formulation Agreement for KDP B identifies the progress made during Phase A and updates and details Phase B.

F.1.3 Each section of the Formulation Agreement template is required. If a section is not applicable to a particular project or single-project program, the project or single-project program indicates that in the appropriate section and provides a rationale. If a section is applicable but the project or single-project program desires to omit the section or parts of a section, then a waiver or deviation needs to be obtained in accordance with the tailoring process for NPR 7120.5. (See Section 3.5.) Approvals for waivers are documented in the Compliance Matrix, and the Compliance Matrix for this NPR is attached to the Formulation Agreement. If the format of the completed project or single-project Formulation Agreement differs from this template, a cross-reference table indicating where the information for each template paragraph is needs to be provided with the document when it is submitted for the MDAA signature.

F.1.4 The approval signatures of MDAA, the Center Director, and the program manager certify that the Formulation Agreement implements all the Agency's applicable institutional requirements or that the owner of those requirements (e.g., Safety and Mission Assurance) has agreed to the modification of those requirements contained in the Formulation Agreement.

F.1.5 Products developed as part of or as a result of the Formulation Agreement may be incorporated into the Project or Single-Project Program Plan, if appropriate, as the Project or Single-Project Program Plan is developed during Formulation. The project or single-project program may use the preliminary Project or Single-Project Program Plan to describe and control the project's or single-project program's execution as long as the Project or Single-Project Program Plan does not conflict with the Formulation Agreement.

F.2 Formulation Agreement Title Page

[*Project or Single-Project Program Name*] Formulation Agreement

[*short title or acronym*]

(Provide a title for the candidate project or single-project program and designate a short title or proposed acronym in parenthesis, if appropriate.)

_____	_____
Mission Directorate Associate Administrator	Date
_____	_____
Center Director (as many signature lines as needed)	Date
_____	_____
Program Manager	Date
_____	_____
Project Manager	Date

By signing this document, signatories are certifying that the content herein is acceptable as direction for managing this project or single-project program and that they will ensure its implementation by those over whom they have authority.

Figure F-1 Formulation Agreement Title Page

F.3 Formulation Agreement Template

[Project or Single-Project Program Name] Formulation Agreement
[short title or acronym]

1.0 Purpose

Describe the purpose of the program/project, including traceability from Formulation Authorization Agreement (FAD). (See Appendix E.)

2.0 Project or Single-Project Program Formulation Framework

Identify the project or single-project program organization chart for Formulation; identify the initial project or single-project program team, key personnel, and responsible Centers and partnerships (as

known) that will contribute during Formulation. Define major roles and responsibilities and identify any Boards and Panels that will be used during Formulation for decision making and managing project or single-project program processes.

Specifically identify the Decision Authority and governing Program Management Council (PMC) for oversight of the program or project, and any delegated Decision Authority and delegated governing PMC, per Section 2.3 of NPR 7120.5.

3.0 Project or Single-Project Program Plan and Project or Single-Project Program Control Plans

Document the project's or single-project program's proposed milestones for delivery of the Project or Single-Project Program Plan and project or single-project program control plans on the project or single-project program schedule and provide rationale for any differences from requirements in product maturities as documented in Appendix I of NPR 7120.5, NASA Space Flight Program and Project Management Requirements.

4.0 Project or Single-Project Program, System, and Subsystem Requirements Flow Down

Document the project's or single-project program's proposed milestones for flow down of requirements to the project or single-project program, system, and subsystem levels on the project or single-project program schedule and provide rationale for any differences from requirements in product maturities as documented in Appendix I of NPR 7120.5. Document the project or single-project program schedule for development of any models needed to support requirements development.

5.0 Mission Scenario, Architectures, and Interfaces

Document the project's or single-project program's proposed milestones for producing the mission concept, mission scenario (or design reference mission), concept of operations, and mission, spacecraft, payload, and ground systems architectures down to the level of subsystem interfaces. Include these milestones on the project or single-project program schedule and provide rationale for any differences from requirements documented in the tables in Appendix I of this NPR.

Reference documentation of the feasible concept, concepts already evaluated, and plans for additional concepts to be evaluated during Formulation. Documentation should include ground rules, assumptions, and constraints used for analysis; key architecture drivers, such as redundancy; preliminary key performance parameters; top-level technical parameters and associated margins; and preliminary driving requirements. Documentation should also include feasible candidate architectures; open architecture issues and how and when those issues will be resolved; basic descriptions of each element; and descriptions of interfaces between elements.

At KDP B update the approved concept and architecture, including a preliminary definition of the operations concept and updated description of composition of payload/suite of instruments. Identify the work required to close all architecture and architectural interface issues.

6.0 Trade Studies

Identify spacecraft and ground systems design trade studies planned during phases A and B, including trade studies that address performance versus cost and risk.

7.0 Risk Mitigation

Document plans for managing risks during Formulation. Identify the project's or single-project program's major technical, acquisition, safety, cost, and schedule risks to be addressed during Formulation, including risks likely to drive the project's or single-project program's cost and schedule range estimates or high and low values for cost and schedule with the corresponding JCL values at KDP B, and cost and schedule estimates at KDP C. Describe the associated risk mitigation plans. Provide rationale for addressing these risks during Formulation.

Document the project's or single-project program's risk mitigation schedule and funding requirements. Include intermediate milestones and expected progress by KDP B and KDP C.

8.0 Technology Readiness Assessment and Development

Identify the specific new technologies (Technology Readiness Levels (TRL) less than six) that are part of this project or single-project program; their criticality to the project's or single-project program's objectives, goals, and success criteria; and the current status of each planned technology development, including TRL and associated risks. Describe the specific activities and risk mitigation plans, the responsible organizations, models, and key tests to ensure that the technology maturity reaches TRL 6 by Preliminary Design Review (PDR). (Refer to NPR 7123.1, NASA Systems Engineering Processes and Requirements, for TRL definitions and SP-20205003605, Technology Readiness Assessment Best Practices Guide for technology readiness assessment best practices.)

Identify off-ramp decision gates and strategies for ensuring there are alternative development paths available if technologies do not mature as expected. Identify potential cost, schedule, or performance impacts if the technology developments do not reach the required maturity levels.

Provide technology development schedules, including intermediate milestones and funding requirements, during phases A and B for each identified technology development to achieve TRL 6 by PDR. Describe expected status of each technology development at SRR, MDR/SDR, and PDR. Reference the preliminary or final Technology Development Plan for details as applicable. Describe how the program will transition technologies from the development stage to manufacturing, production, and insertion into the end system. Identify any potential costs and risks associated with the transition to manufacturing, production, and insertion. Develop and document appropriate mitigation plans for the identified risks.

9.0 Engineering Development Assessment, Prototyping, and Software Models

Identify major engineering development risks and any engineering prototyping or software model development that needs to be accomplished during phases A and B to reduce development risk (Engineering development risks include components and assemblies that have not been previously built or flown in the planned environment or that have been significantly modified in functionality, interfaces, power consumption, size, or use of materials.). Provide rationale and potential impacts to project or single-project program performance, cost, and schedule if development risks are not addressed. Describe the scope of the prototyping and modeling activities and the expected reduction of cost and risk by performing this work during Formulation. Include the project or single-project program's testing philosophy, including functional, environmental, and qualification testing, any life testing and protoflight test plans, and rationale.

Describe the prototypes and software models to be built, their fidelity (form, fit, and function, etc.), test environments and objectives, and test dates. Identify any design alternatives if irresolvable problems are encountered.

Provide prototype and software model development and test schedules, including intermediate

milestones and funding requirements during phases A and B. Describe expected status and accomplishments for each prototype or software model at SRR, MDR/SDR, and PDR.]

Focus during Phase A should be on component and subassembly prototypes built to approximately the correct size, mass, and power, with “flight-like” parts and materials, and tested in a laboratory environment over the extremes of temperature and radiation (if relevant). Focus during Phase B should be on testing form, fit, and function prototypes over the extremes of what will be experienced during flight.

Identify key performance parameters, associated modeling methodologies, and methods for tracking KPPs throughout Formulation. In addition, identify any planned investments, divestments, acquisition strategies, procurements, agreements, and changes to capability portfolio capability components in accordance with requirements and strategic guidance included in NPR 8600.1, NASA Capability Portfolio Management Requirements. (See Appendix A for definitions of capability portfolio and capability component.)

10.0 Heritage Assessment and Validation

Identify the major heritage hardware and software assumptions and associated risks and the activities and reviews planned to validate those assumptions during Formulation. Identify schedule and funding requirements for those activities. See SP-20205003605, Technology Readiness Assessment Best Practices Guide.

11.0 Acquisition Strategy and Long-lead Procurements

Identify acquisition and partnership plans during Formulation. Document the project’s or single-project program’s proposed milestones for in-house work and procurements, including completing any Contract Statements of Work (SOW) and Requests for Proposal (RFP) during the Formulation phase. Identify long-lead procurements to be initiated and provide associated rationale. Identify procurements of material and services necessary for life-cycle sustainment. Identify anticipated partnerships (other government agencies and U.S. and international partners), if any, including roles and contributed items and plans for getting commitments for contributions and finalizing open inter-agency agreements, domestic partnerships, and foreign contributions. Point to the preliminary or final Acquisition Strategy for details, as applicable.

Identify major acquisition risks, including long-lead procurement risks and partnership risks.

Identify funding requirements for procurement activities, long-lead procurements, and partnerships.

12.0 Formulation Phase Reviews

Identify and provide schedules for the project or single-project program life-cycle reviews (SRR, SDR/MDR) and the system and subsystem-level reviews to be held during Formulation. Include inheritance reviews, prototype design reviews, technology readiness reviews, fault protection reviews, etc., necessary to reduce risk and enable more accurate cost and schedule range estimates or high and low values for cost and schedule with the corresponding JCL values at KDP B and more accurate cost and schedule estimates at KDP C.

13.0 Formulation Phase Cost and Schedule Estimates

Document the project’s or single-project program’s Formulation Phase schedule and phased funding requirements, including cost and schedule margins, aligned with the project or single-project program Work Breakdown Structure (WBS). Identify the critical path.

Ensure that all funding requirements in this Agreement are included and clearly identifiable. Summarize funding requirements both in dollars and estimated percent of total costs phases A–D.

Ensure that the schedules for all technology development, engineering prototyping, procurement and risk mitigation activities, and milestones identified in this Agreement are included and clearly identifiable. Provide schedule details to the appropriate level to justify Formulation funding requirements (typically subsystem level).

Include any additional milestones required in product maturities as documented in Appendix I in NPR 7120.5, including the development of life-cycle or initial capability cost and schedule ranges or high and low values for cost and schedule with the corresponding JCL values due at KDP B and the JCL at KDP C, if required.

Identify the schedule for developing the project's or single-project program's EVM capabilities, if EVM is required.

14.0 Leading Indicators

Document the project's or single-project program's programmatic and technical leading indicators for the Formulation Phase.

Project or single-project programs develop and maintain the status of a set of programmatic and technical leading indicators to ensure proper progress and management of the project or single-project program are achieved during Formulation. Status and trends of leading indicators should be presented at LCRs and KDPs. These leading indicators include:

- Requirement Trends (percent growth, TBD/TBR (to be resolved) closures, number of requirement changes).
- Interface Trends (percent Interface Control Document (ICD) approvals, TBD/TBR burn down, number of interface requirement changes).
- Review Trends (Review Item Discrepancy (RID)/Request for Action (RFA)/Action Item burn down per review).
- Formulation Cost Trends (Plan vs. actual, UFE).
- Schedule Trends (critical path slack/float, critical milestone dates).
- Staffing Trends (Full-Time Employee (FTE)/Work Year Equivalent (WYE) (plan vs. actual)).
- Technical Performance Measures (Mass margin, power margin).
- Additional project or single-project program-specific indicators, as needed.

These indicators are further explained in the NASA Space Flight Program and Project Management Handbook, NASA/SP-2014-3705; the NASA Project Planning and Control Handbook, NASA/SP-2016-3424; and the NASA Common Leading Indicators Detailed Reference Guide at https://nodis3.gsfc.nasa.gov/OCE_rep/OCE_list.cfm.

15.0 Appendices

Appendix A. Acronyms
Appendix B. Definitions
Appendix C. Compliance Matrix for this NPR

Appendix G. Program Plan Template

G.1 Template Instructions

G.1.1 The Program Plan is an agreement among the program manager, Center Director, and Mission Directorate Associate Administrator (MDAA). Other Center Directors providing a significant contribution to the program also concur with the Program Plan to document their commitment to provide required Center resources. The Program Plan defines the goals and objectives of the program, the environment within which the program operates, and the Management Agreement commitments of the program, including identifying the high-level requirements on both the program and each constituent project. These requirements on the project may be in the body of the Plan or added as appendices. The Program Plan is to be updated and approved during the program life cycle if warranted by changes in the stated Management Agreement commitments.

G.1.2 In this Program Plan template, all subordinate plans, collectively called control plans, are required unless they are not applicable or are marked as “Best Practice” in the applicable table in Appendix I (i.e., I-Table). (The expectation is that products marked as “Best Practice” will be developed per the I-Table as part of normal program management activities.) They are based on requirements in NASA Policy Directives (NPDs) and NASA Procedural Requirements (NPRs) that affect program/project planning. If a control plan is not applicable to a particular program, indicate that by stating it is not applicable in the appropriate section and provide a rationale. Control plans can either be part of the Program Plan or separate stand-alone documents referenced in the appropriate part of the Program Plan. Considerations for determining if a control plan should be a stand-alone document include a requirement that the control plan be stand-alone in the NPR that requires the control plan; differences between when the control plan is baselined and when the Program Plan is baselined; how frequently the control plan will be updated; and how long the control plan is. When the control plan is a stand-alone document, the Program Plan contains a reference to the stand-alone document.

G.1.3 Each section of the Program Plan template is required. If a section is not applicable to a particular program, indicate in the appropriate section and provide a rationale. If a section is applicable but the program desires to omit the section or parts of a section, then a waiver needs to be obtained in accordance with the requirement tailoring process for NPR 7120.5, NASA Space Flight Program and Project Management Requirements. Approvals are documented in Part 4.0, Waivers or Deviations Log, of the Program Plan. In addition, the program’s Compliance Matrix for this NPR is attached to the Program Plan. If the format of the completed Program Plan differs from this template, a cross-reference table indicating where the information for each template paragraph is needs to be provided with the document when it is submitted for MDAA signature.

G.1.4 The approval signatures of the MDAA, the Center Director, and the program manager certify that the Program Plan implements all the Agency’s applicable institutional requirements or that the authority responsible for those requirements (e.g., Safety and Mission Assurance, have granted a deviation or waiver to the modification of those requirements.

G.1.5 Single-project programs may combine the Program and Project Plans into a single document if the MDAA agrees.

G.2 Program Plan Title Page

[*Program Name*] Program Plan

[*short title or acronym*]

(Provide a title for the candidate program and designate a short title or proposed acronym in parenthesis, if appropriate.)

_____ _____
Mission Directorate Associate Administrator Date

_____ _____
Center Director (as many signature lines as needed)* Date

_____ _____
Program Manager Date

By signing this document, signatories are certifying that the content herein is acceptable as direction for managing this program and that they will ensure its implementation by those over whom they have authority.

* Where a program is managed from HQ exclusively, the NASA Associate Administrator signs in place of the Center Director or the NASA Associate Administrator may delegate this responsibility to the NASA Chief Engineer.

Figure G-1 Program Plan Title Page

G.3 Program Plan Template

[Program Name] Program Plan
[short title or acronym]

1.0 PROGRAM OVERVIEW

1.1 Introduction

Briefly describe the background of the program and its current status, including results of Formulation activities, decisions, and documentation. Specify the type of program (i.e., single-project, uncoupled, loosely coupled, or tightly coupled) and the basis for that classification. Specify if there are plans for continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point, for:

- Each project.
- Single-project programs.

1.2 Goals and Objectives

State program goals and specific objectives and provide clear traceability to the Agency's strategic goals and to Mission Directorate strategic goals and objectives. Program performance goals and their relationship to NASA program goals set forth in NPD 1001.0, NASA Strategic Plan should be expressed in an objective, quantifiable, and measurable form. Goals and objectives should include specific commitments to safety and mission success.

1.3 Program Architecture

Briefly describe the architecture of the program, its major components, and the way they will be integrated. Describe how the major program components are intended to operate together, and with legacy systems, as applicable, to achieve program goals and objectives.

Provide a summary-level technical description of the program, including constituent projects and operations concepts. The description should also include mission description, program interfaces, facilities, logistics concepts, planned mission results, and data analysis, archiving, and reporting. Identify driving ground rules and assumptions and major constraints affecting program systems development (e.g., cost, launch window, required launch vehicle, mission planetary environment, fuel/engine design, human systems integration, and foreign partners).

For single-project programs and projects that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point, define the scope of the initial capability.

Describe how the program will relate to other organizations within and outside NASA. Reference Section 3.4, Acquisition Strategy in this template (below) or provide the following information here:

For organizations within NASA, describe the roles of each in the program, including technology efforts, space communications, and launch services.

For organizations outside NASA, describe the role of each in the program, including other government agencies, academia, industry, and international partners as they are known at the start of the program.

1.4 Stakeholder Definition

Identify the main stakeholders of the program (e.g., PI, science community, technology community, public, education community, and Mission Directorate sponsor(s)) and the process to be used within the program to ensure stakeholder advocacy.

1.5 Program Authority, Management Approach, and Governance Structure

Specifically identify the Decision Authority and governing Program Management Council (PMC) for oversight of the program, and any delegated Decision Authority and delegated governing PMC, per Section 2.3 of NPR 7120.5.

Describe the program management structure, including each participating organization's responsibilities. Identify:

- The Center where the program manager resides.
- The Centers involved and each Center's responsibilities, as they relate to their respective requirement allocations referenced in Section 2.1, Requirements Baseline below.

Describe the chain of accountability and decision path outlining the roles and responsibilities of the Mission Directorate sponsor(s), program manager, Center Director, and other authorities (including the Technical Authorities), as required. Provide a high-level description of the project's organization within the program, showing the chain of accountability. Describe clear lines of authority from projects and Centers to the program, and to the Mission Directorate, and frequency of reporting for each. Illustrate the organization graphically. Describe the process by which projects are formulated, approved, and terminated.

1.6 Implementation Approach

Describe briefly the implementation approach of the program, including any applicable guidance or direction from the ASM review, the acquisition strategy (e.g., in-house, NASA Centers, and contractor primes), partners, and partner contributions, including innovative acquisition approaches such as commercial or other partners who will develop end products that are not owned by NASA but provided as services to NASA, if appropriate. Include make-or-buy decision plans and trade studies.

Identify and document concurrence for any investments, divestments, acquisition strategies, procurements, agreements, and changes to capability portfolio capability components in accordance with requirements and strategic guidance included in NPR 8600.1, NASA Capability Portfolio Management Requirements. (See Appendix A for definitions of capability portfolio and capability component.)

Document the agreements on the use of implementation policies and practices between the program manager and participating NASA Centers in this section (or in appendices to the document), along with the program's approach to ensuring that interfaces do not increase risk to mission success. (For tightly coupled programs, the program manager, the NASA Chief Engineer, and the Center Chief Engineers (or designees) participating in the program establish the engineering best practices for the program. These decisions are documented here.)

2.0 PROGRAM BASELINES

2.1 Requirements Baseline

Program Requirements. Document the high-level program requirements, including performance, safety, and programmatic requirements and correlate them to Agency and Mission Directorate strategic objectives and requirements. Describe the process by which program requirements are verified for compliance. Describe the process for controlling changes to program requirements. Document the traceability of requirements that flow down from Agency- and Center-level policy to the program and from the program to projects.

Requirements Documentation. For tightly coupled programs and single-project programs, decompose these high-level requirements into requirements on constituent projects or systems, specified herein or in a separate, configuration-controlled, program requirements document to be prepared by the program manager and approved by the MDAA. Additional concurrences may be required at the option of the NASA AA. There may also be subordinate project requirements documents controlled at lower levels.

For uncoupled or loosely coupled programs, apply these high-level requirements to generate the program's requirements on each constituent project. This documentation is controlled by the Mission Directorate and may be located in the body of the Program Plan or in a subsequent appendix. Requirements thus documented, and any subsequent changes, require approval of the program manager, MDAA, and participating Center Director(s).

Program Requirements on Projects. For each project, provide a top-level description, including the mission's science or exploration objectives. Document the project's category, Decision Authority, governing PMC, and risk classification or identify where this information is documented. Describe the project's mission, performance, and safety requirements. For science missions, include baseline science requirements, threshold science requirements, and mission data requirements. (See Appendix A for definitions of baseline and threshold science requirements.) Identify the mission success criteria for each project based on the threshold science requirements. State each requirement in objective, quantifiable, and verifiable terms. Identify the project's principal schedule milestones, including Preliminary Design Review (PDR), Critical Design Review (CDR), launch, mission operational-critical milestones, and the planned decommissioning date. State the development and/or total life-cycle or initial capability cost constraints on the project. Set forth any budget constraints by fiscal year. State the specific conditions under which a project Termination Review would be triggered. Describe any additional requirements on the project (e.g., international partners). If the mission characteristics indicate a greater emphasis is necessary on maintaining technical, cost, or schedule, then identify which is most important (e.g., state if the mission is cost capped; or if schedule is paramount, as for a planetary mission; or if it is critical to accomplish all of the technical objectives, as for a technology demonstration mission).

2.2 WBS Baseline

Provide the program's Work Breakdown Structure (WBS) and WBS dictionary down to the project level developed in accordance with guidance provided by the NASA Work Breakdown Structure (WBS) Handbook, NASA/SP-2010-3404, which can be found on the OCE tab under the "Other NASA-Level Documents" menu in NODIS. The WBS will support cost and schedule allocation down to a project level that allows for unambiguous cost reporting.

2.3 Schedule Baseline

Present a summary of the program's integrated master schedule (IMS), including all critical milestones, major events, life-cycle reviews, and KDPs throughout the program life cycle. The

summary of the master schedule should include the logical relationships (interdependencies) for the various program elements and projects and critical paths, as appropriate. Identify driving ground rules, assumptions, and constraints affecting the schedule baseline.

2.4 Resource Baseline

Present the program's funding requirements by fiscal year. State the New Obligation Authority (NOA) in real-year dollars for all years—prior, current, and remaining. The funding requirements are to be consistent with the program's WBS and include funding for all cost elements required by the Agency's full-cost accounting procedures. Funding requirements are to be consistent with the budget. Provide a breakdown of the program's funding requirements to the WBS Level 2 elements. Present the program-specific (i.e., not individual project) workforce requirements by fiscal year, consistent with the program's funding requirements and WBS. Throughout the Implementation Phase, baselines are to be based on the joint cost and schedule confidence level in accordance with NPD 1000.5, Policy for NASA Acquisition and NPR 7120.5.

Describe the program infrastructure requirements (acquisition, renovations, and/or use of real property/facilities, aircraft, personal property, and information technology). Identify means of meeting infrastructure requirements through synergy with other existing and planned programs and projects to avoid duplication of facilities and capabilities. Identify necessary upgrades or new developments, including those needed for environmental compliance.

Identify driving ground rules, assumptions, and constraints affecting the resource baseline.

Document the constituent projects' Commitment Baselines (i.e., ABC).

2.5 Joint Cost and Schedule Confidence Level

For single-project programs, document the joint cost and schedule confidence level approved by the Decision Authority at KDP C. For single-project programs with an estimated life-cycle or initial capability cost greater than or equal to $1B, update the joint cost and schedule confidence level at CDR and at KDP D (if applicable).

3.0 PROGRAM CONTROL PLANS

3.1 Technical, Schedule, and Cost Control Plan

This control plan will include the following:

Describe the plan to monitor and control the program requirements, technical design, schedule, and cost to achieve its high-level requirements.

Describe the program's performance measures in objective, quantifiable, and measurable terms and document how the measures are traced from the program high-level requirements. Establish baseline and threshold values for the performance metrics to be achieved at each Key Decision Point (KDP), as appropriate. In addition, document the mission success criteria associated with the program-level requirements that, if not met, trigger consideration of a Termination Review.

Tightly coupled and single-project programs also develop and maintain the status of a set of programmatic and technical leading indicators to ensure proper progress and management of the program. Status and trends of leading indicators should be presented at LCRs and KDPs. These leading indicators include:

- Requirement Trends (percent growth, TBD/TBR closures, number of requirement changes).
- Interface Trends (percent ICD approval, TBD/TBR burn down, number of interface requirement changes).
- Verification Trends (closure burn down, number of deviations/waivers approved/open).
- Review Trends (RID/RFA/Action Item burn down per review).
- Software Unique Trends (number of requirements per build/release versus plan).
- Problem Report/Discrepancy Report Trends (number open, number closed).
- Cost Trends (Plan vs. actual, UFE, EVM).
- Schedule Trends (critical path slack/float, critical milestone dates).
- Staffing Trends (FTE/WYE plan vs. actual).
- Technical Performance Measures (Mass margin, power margin).
- Manufacturing Trends (Number of nonconformance/corrective actions (open/closed/resolved)).
- Additional program-specific indicators, as needed.

These indicators are further explained in the NASA Space Flight Program and Project Management Handbook, NASA/SP-2014-3705; the NASA Project Planning and Control Handbook, NASA/SP-2016-3424; and the NASA Common Leading Indicators Detailed Reference Guide at https://nodis3.gsfc.nasa.gov/OCE_rep/OCE_list.cfm.

Describe how constituent projects will periodically report performance. Describe mitigation approach if projects are exceeding their development cost documented in the ABC to enable corrective action prior to triggering the 30 percent breach threshold. Describe how projects will support a baseline review in the event the Decision Authority (DA) directs one. Describe how the program will implement the Système Internationale (SI) and other systems of measurement and the identification of units of measure in all product documentation. Where full implementation of the SI system of measurement is not practical, hybrid configurations (i.e., a controlled mix of SI and non-SI system elements) may be used to support maximum practical use of SI units for design, development, and operations. Where hybrid configurations are used, describe the specific requirements established to control interfaces between elements using different measurement systems. (See NPR 7120.5, Section 3.7, for SI assessment timing requirement.)

Describe the program's implementation of Technical Authority (Engineering, Safety and Mission Assurance, and Health and Medical).

For tightly coupled programs, describe the program's EVMS, if EVM requirements are to be levied at the program level. For loosely coupled or uncoupled programs, describe the EVM requirements flowed down to the projects. Include plan for flow down of EVM requirements and reporting to support project EVM.

Describe any additional specific tools the program will use to implement the program control processes (e.g., the requirements management system, the program scheduling system, or the program information management systems).

Describe how the program will monitor and control the integrated master schedule (IMS).

Describe how the program will utilize its technical and schedule margins and Unallocated Future Expense (UFE) to control the Management Agreement.

Describe how the program plans to report technical, schedule, and cost status to the MDAA, including frequency and the level of detail.

Describe how the program will address technical waivers and deviations and how Formal Dissents will be handled.

3.2 Safety and Mission Assurance Plan

Develop a program Safety and Mission Assurance (SMA) Plan as required by NPR 8705.2, Human-Rating Requirements for Space Systems for crewed missions and NPR 8705.4, Risk Classification for NASA Payloads for un-crewed missions and payloads.

The SMA Plan reflects a program life-cycle SMA process perspective, addressing areas including: SMA domain management and integration (e.g., for safety, reliability, maintainability, quality, planetary protection, etc.) with other engineering and management functions (e.g., concept and design trade-studies; risk analysis and risk assessments; risk-informed decision making; fault tolerance and contingency planning; knowledge capture; hardware and software design assurance; supply chain risk management and procurement; hardware and software design verification, and test; manufacturing process design and control; manufacturing and product quality assurance; system verification and test; pre-flight verification and test; operations; maintenance; logistics planning; maintainability and sustainability; operational reliability and availability; decommissioning; and disposal).

Describe how the program will develop and manage a Closed-Loop Problem Reporting and Resolution System. Describe how the program develops, tracks, and resolves problems. The process should include a well-defined data collection system and process for hardware and software problems and anomaly reports, problem analysis, and corrective action.

Identify the program's approach to flow down requirements as appropriate to external developers and suppliers in acquisitions (e.g., contracts and purchase orders).

Describe how the program will develop, evaluate, and report indications of SMA program maturity and effectiveness at life cycle or other executive reviews, including through the use of metrics and indicators that are not otherwise included in formal life cycle review deliverables or are not elements of the certification of flight readiness (COFR) process (e.g., satisfactory progress towards human rating).

3.3 Risk Management Plan

Develop a Risk Management Plan that includes the content required by NPR 8000.4, Agency Risk Management Procedural Requirements. Summarize how the program will implement the NASA risk management process (including risk-informed decision making (RIDM) and continuous risk management (CRM) in accordance with NPR 8000.4, Agency Risk Management Procedural Requirements. Include the initial Significant Risk List and appropriate actions to mitigate each risk. Programs with international or other U.S. Government agency contributions need to plan for, assess, and report on risks due to international or other government partners and plan for contingencies.

3.4 Acquisition Strategy

The program Acquisition Strategy is developed by the program manager, supported by the Office of Procurement, and needs to be consistent with NPD 1000.5, Policy for NASA Acquisition, the results of the Agency strategic acquisition process, and the ASM. The elements of the program Acquisition Strategy should be reflected in any resulting Procurement Strategy Meeting (PSM) for individual procurement activity supporting the program Acquisition Strategy. It documents an integrated acquisition strategy that enables the program to meet its mission objectives and provides the best

value to NASA. The Acquisition Strategy should include, but is not limited to, the following:

Identify all major proposed acquisitions (such as engineering design study, hardware and software development, mission and data operations support, and sustainment) in relation to the program WBS. Provide summary information on each such proposed acquisition, including a Contract WBS; major deliverable items; recommended type of procurement (competitive, AO for instruments); type of contract (cost-reimbursable, fixed-price); source (institutional, contractor, other U.S. Government agency, or international organization); procuring activity; and surveillance approach. Identify those major procurements that require a PSM.

Describe completed or planned studies supporting 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.

Describe the state of the industrial base capability and identify potential critical and single-source suppliers needed to design, develop, produce, support, and, if appropriate, restart an acquisition program or project. The acquisition strategy should promote sufficient program/project stability to encourage industry to invest, plan, and bear their share of risk. Describe the internal and external mechanisms and procedures used to identify, monitor, and mitigate industrial base and supply chain risks. Include data reporting relationships to allow continuous surveillance of the entire supply chain that provides for timely notification and mitigation of potential risks associated with the industrial base or supply chain. Describe the process for reporting industrial base and supply chain risks to the MDAA.

Identify the program's approach to strengthen safety and mission assurance in the contract.

Describe all agreements, memoranda of understanding, barters, in-kind contributions, and other arrangements for collaborative and/or cooperative relationships. Include partnerships created through mechanisms other than those prescribed in the FAR and the NFS. List all such agreements (the configuration control numbers, the date signed or projected dates of approval, and associated record requirements) necessary for program success. Include or reference all agreements concluded with the authority of the program manager and reference agreements concluded with the authority of the MDAA and above. Include the following:

(1) NASA agreements (e.g., space communications, launch services, and inter-Center memoranda of agreement).

(2) Non-NASA agreements:

(a) Domestic (e.g., U.S. Government agencies).

(b) International (e.g., memoranda of understanding).

Describe intellectual property considerations and goals for advanced technologies to protect core NASA interests during the program life cycle; the process for respecting and protecting privately developed intellectual property; the process for ensuring acquisition strategies, proposals, and contract awards reflect intellectual property considerations established for the program; the approach for ensuring that the intellectual property strategy promotes competition for post-production sustainment/modernization contracts; the approach for seeking flexible and creative solutions to intellectual property issues that meet the desires of the parties and reflect NASA's investment; the approach for ensuring procurement contracts specify both (1) the delivery of necessary technical data and computer software and (2) the license rights necessary for technical data and computer

software; and the approach for ensuring the delivery of technical data and computer software under procurement contracts is marked in accordance with the contract at the time of delivery.

3.5 Technology Development Plan

Describe the technology assessment, development, management, and acquisition strategies (including intellectual property considerations) needed to achieve the program's mission objectives.

Describe how the program will assess its technology development requirements, including how the program will evaluate the feasibility, availability, readiness, cost, risk, and benefit of the new technologies. The approach should include timely reporting of new technologies to the Center Technology Transfer Office and supporting technology transfer activities as described in NPR 7500.2, NASA Technology Transfer Requirements.

Describe how the program will identify opportunities for leveraging on-going technology efforts.

Describe how the program will transition technologies from the development stage to the manufacturing and production phases. Identify the supply chain needed to manufacture the technology and any costs and risks associated with the transition to the manufacturing and production phases. Develop and document appropriate mitigation plans for the identified risks.

Describe the program's strategy for ensuring that there are alternative development paths available if/when technologies do not mature as expected. (Refer to NPR 7123.1 for TRL definitions and SP-20205003605, Technology Readiness Assessment Best Practices Guide for technology readiness assessment best practices. The Technology Readiness Assessment Best Practices Guide can be found in NODIS on the OCE tab under the "Other NASA-Level Documents" menu.)

Describe how the program will remove technology gaps, including maturation, validation, and insertion plans, performance measurement at quantifiable milestones, off-ramp decision gates, and resources required.

Describe briefly how the program will ensure that all planned technology exchanges, contracts, and partnership agreements comply with all laws and regulations regarding export control and the transfer of sensitive and proprietary information.

Describe how the program will transition technologies from the development stage to manufacturing, production, and insertion into the end system. Identify any potential costs and risks associated with the transition to manufacturing, production, and insertion. Develop and document appropriate mitigation plans for the identified risks.

3.6 Systems Engineering Management Plan

Develop a SEMP that includes the content required by NPR 7123.1, NASA Systems Engineering Processes and Requirements. Include descriptions of the program's overall approach for systems engineering, to include system design and product realization processes (implementation and/or integration, verification and validation, and transition), as well as the technical management processes.

3.7 Verification and Validation Plan

Summarize the approach for performing verification and validation of the program products. Indicate the methodology to be used in the verification/validation (test, analysis, inspection, or demonstration) as defined in NPR 7123.1, NASA Systems Engineering Processes and

Requirements.

3.8 System Security Plan

Identify and prepare a System Security Plan for each information system. The System Security Plan is a formal document that provides an overview of the security requirements for an information system and describes the security controls in place or planned for meeting those requirements.

System Security Plans are generated and stored within the NASA Risk Information and Security Compliance System (RISCS) at https://riscs-info.nasa.gov/. Multiple systems may be covered under a single System Security Plan. Controls selected within the System Security Plan are included as system requirements for the system or systems covered by the plan.

Document the program's approach to implementing cybersecurity requirements in accordance with NPR 2810.1, Security of Information Technology, if there are requirements outside the scope of the System Security Plan(s).

3.9 Review Plan

Summarize the program's approach for conducting a series of reviews, including internal reviews and program life-cycle reviews. In accordance with Center best practices, MD review requirements, and the requirements in NPR 7123.1, NASA Systems Engineering Processes and Requirements and NPR 7120.5, NASA Space Flight Program and Project Management Requirements, provide the names, purposes, content, and timing of the life-cycle reviews.

Identify any deviations from these documents that the program is planning or waivers that have been granted, including tailoring to accommodate aspects of innovative acquisition approaches. Specify the considerations that will be used to trigger a discussion on the need for a PIR with the NASA AA. (See Section 2.2.4.2 and Considerations for a PIR in Appendix A.) Provide the technical, scientific, schedule, cost, and other criteria that will be utilized in the consideration of a Termination Review.

For single-project programs that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point, define the initial capability in the Review Plan for KDP B if the initial capability is not the first operational mission flight.

For tightly coupled programs that involve multiple Centers, document the program life-cycle review requirements on the supporting projects that represent an integrated review process for the various projects and take into consideration the participating Centers' review process best practices. For each program life-cycle review and KDP, document the sequencing of the associated project life-cycle reviews and KDPs, i.e., whether the associated project life-cycle reviews and KDPs precede or follow the program life-cycle review and KDP. In addition, document which projects should proceed to their KDPs together, which projects should proceed to their KDPs simultaneously with the program KDP, and which projects may proceed to their KDPs as individual projects.

The sequencing of project life-cycle reviews and KDPs with respect to program life-cycle reviews and KDPs is especially important for project PDR life-cycle reviews that precede KDP Cs. At KDP C, the Agency makes project technical, cost, and schedule commitments to its external stakeholders at the established JCL in accordance with NPR 7120.5 requirements. Since changes to one project can easily impact other projects' technical, cost, schedule, and risk baselines, projects and their program may need to proceed to KDP C/KDP I together.

3.10 Mission Operations Plan

Describe the activities required to perform the mission. Describe how the program will implement the associated facilities, hardware, software, and procedures required to complete the mission. Describe mission operations plans, rules, and constraints. Describe the Mission Operations System (MOS) and Ground Data System (GDS) in the following terms:

- MOS and GDS human resources and training requirements.
- Procedures to ensure that operations are conducted in a reliable, consistent, and controlled manner using lessons learned during the program and from previous programs.
- Facilities requirements (offices, conference rooms, operations areas, simulators, and test beds).
- Hardware (ground-based communications and computing hardware and associated documentation).
- Software (ground-based software and associated documentation).

3.11 NEPA Compliance Documentation

Describe the level of NEPA analysis planned to comply with NPR 8580.1, Implementing the National Environmental Policy Act, and Executive Order 12114. The NEPA Compliance Documentation should be prepared based on consultation with the appropriate NEPA manager (Center NEPA Manager or Mission Direction NEPA Liaison) and describe the program's NEPA strategy at all affected Centers, including decisions regarding programmatic NEPA documents. Insert into the program schedule the critical NEPA milestones if preparation of an Environmental Assessment or Environmental Impact Statement is planned.

3.12 Integrated Logistics Support Plan

Describe how the program will implement NPD 7500.1, Program and Project Life-Cycle Logistics Support Policy, including a maintenance and support concept; participation in the design process to enhance supportability; supply support; maintenance and maintenance planning; packaging, handling, and transportation; technical data and documentation; support and test equipment; training; manpower and personnel for Integrated Logistics Support (ILS) functions; facilities required for ILS functions; and logistics information systems for the life of the program.

3.13 Science Data Management Plan

Describe how the program will manage the scientific data generated and captured by the operational mission(s) and any samples collected and returned for analysis. Include descriptions of how data will be generated, processed, distributed, analyzed, and archived, as well as how any samples will be collected, stored during the mission, and managed when returned to Earth. The Plan should include definitions of data rights and services and access to samples, as appropriate. Identify where the preliminary science data requirements will be documented (these requirements should be documented by SRR). The Plan should be developed in consultation with the Mission Directorate data leads and the Office of the Chief Information Officer (OCIO) early in the program life-cycle to ensure that metadata standards and data formats are appropriately considered and that infrastructure and security requirements are addressed.

Explain how the program will accomplish the information management and disposition in NPD 2200.1, Management of NASA Scientific and Technical Information; NPR 2200.2, Requirements for Documentation, Approval and Dissemination of Scientific and Technical Information; and NPR 1441.1, NASA Records Management Program Requirements, as applicable to program science data.

Explain how the program will implement NASA sample handling, curation, and planetary protection directives and rules, including NPR 8020.12, Planetary Protection Provisions for Robotic Extraterrestrial Missions.

3.14 Configuration Management Plan

Describe the configuration management (CM) approach that the program team will implement. Describe the CM planning and management function including the CM organization and tools to be used. Describe the methods and procedures to be used for configuration identification, configuration control, interface management, configuration change management, configuration verification and audit, and configuration status accounting and communications. Describe how CM will be audited and how contractor CM processes will be integrated with the program. Configuration Management should address hardware, software, and firmware. Additional information on configuration management is provided in NPR 7123.1 and SAE/EIA 649, Standard for Configuration Management.

3.15 Security Plan

Describe the program's plans for ensuring security, including:

Security Requirements: Describe the program's approach for planning and implementing the requirements for physical, personnel, and industrial security, and for security awareness/education requirements in accordance with NPR 1600.1, NASA Security Program Procedural Requirements.

Emergency Response Requirements: Describe the program's emergency response plan in accordance with NPR 1040.1, NASA Continuity of Operations (COOP) Planning Procedural Requirements and define the range and scope of potential crises and specific response actions, timing of notifications and actions, and responsibilities of key individuals.

3.16 Technology Transfer (formerly Export) Control Plan

Describe how the program will implement the export control requirements specified in

NPR 2190.1, NASA Export Control Program.

3.17 Communications Plan

Develop a Communications Plan in collaboration with the Associate Administrator for the Office of Communications or their designee that identifies key program milestones that will be of interest to the general public, the media, and other key stakeholders and plans to engage these audiences via audio and real and/or near real-time high resolution video and/or imagery for each milestone including during full mission operations. Summarize how these efforts will promote understanding of and engagement with program objectives, elements, benefits, and contributions to overarching NASA goals. In collaboration with the Associate Administrator for the Office of Communications or their designee, identify resources and technical requirements for implementation of communications for the general public, media, and other key stakeholders. (See the Communications Plan Template (on the Web site for the Office of Communications, http://communications.nasa.gov/content/nasa-comm-guidelines.)

3.18 Knowledge Management Plan

Describe the program's approach to creating the program's knowledge management strategy and processes. Strategy should include practices for examining the lessons learned database for relevant

lessons that can be reflected in the program early in the planning process to avoid known issues; identifying, capturing, and transferring knowledge; and continuously capturing and documenting lessons learned throughout the program life cycle in accordance with NPD 7120.4, NASA Engineering and Program/Project Management Policy and as described in NPD 7120.6, Knowledge Policy for Programs and Projects and other appropriate requirements and standards documentation.

3.19 Human Rating Certification Package

For human space flight missions, develop a Human Rating Certification Package per

NPR 8705.2, Human-Rating Requirements for Space Systems. Human rating certification focuses on the integration of the human into the system, preventing catastrophic events during the mission, and protecting the health and safety of humans involved in or exposed to space activities, specifically the public, crew, passengers, and ground personnel.

3.20 Quality Assurance Surveillance Plan

Develop a consolidated set of detailed instructions for the performance of Government contract quality assurance review and evaluation for the program. The plan might include contractor documents, data, and records; products and product attributes; processes; quality system elements/attributes; and requirements related to quality data analysis, nonconformance reporting and corrective action tracking/resolution, and final product acceptance. (See NASA-STD-8709.22, Safety and Mission Assurance Acronyms, Abbreviations, and Definitions.)

3.21 Orbital Collision Avoidance Plan

Describe how the program implements the design considerations and preparation for operations to avoid in-space collisions. The plan ensures the space flight mission meets the requirements of NID 7120.132, Collision Avoidance for Space Environment Protection. Include in the plan a project overview including a concept of operation, how orbit selection was performed, the spacecraft's ascent and descent plan, how the spacecraft's location tracking data will be generated, and whether there will be any autonomous flight control. Discuss how the spacecraft's design will enable it to be acquired and tracked by the Space Surveillance Network and be cataloged by the U.S. Space Command. Describe the process to routinely coordinate with other operator(s) for maneuvering. Appendix C of the NID provides a template for this plan. (See NID 7120.132, Collision Avoidance for Space Environment Protection for more detail and plan template.)

3.22 Human Systems Integration Plan

Tightly coupled and single-project programs develop a Human Systems Integration (HSI) Plan that describes how human systems integration and human centered design will be integrated into the program design process and life cycle, including what types of human systems integration resources, tools, analysis, testing, and products will be employed/developed to ensure successful human systems integration, thereby reducing mission risk and total life-cycle or initial capability cost, while increasing overall safety. The plan also describes roles and responsibilities related to implementation of HSI. (See the NASA Human Systems Integration (HSI) Handbook, NASA/SP-20210010952, for additional information.)

4.0 WAIVERS OR DEVIATIONS LOG

Identify NPR 7120.5 requirements for which a waiver or deviation has been requested and approved consistent with program characteristics such as scope, complexity, visibility, cost, safety, and

acceptable risk, and provide rationale and approvals.

5.0 CHANGE LOG

Record changes in the Program Plan.

6.0 APPENDICES

Appendix A. Acronyms
Appendix B . Definitions
Appendix C. Compliance Matrix for this NPR

Appendix H. Project Plan Template

H.1 Template Instructions

H.1.1 The Project Plan is an agreement among the project manager, program manager, Center Director, and the Mission Directorate Associate Administrator (MDAA). Other Center Directors providing a significant contribution to the project also concur with the Project Plan to document their commitment to provide required Center resources. It defines, at a high level, the scope of the project, the implementation approach, the environment within which the project operates, and the baseline commitments of the program and project. The Project Plan is consistent with the Program Plan. The Project Plan is updated and approved during the project life cycle in response to changes in program requirements on the project or the baseline commitments.

H.1.2 In this Project Plan template, all subordinate plans, collectively called control plans, are required unless they are not applicable or are marked as “Best Practice” in the applicable table in Appendix I (i.e., I-Table). (The expectation is that products marked as “Best Practice” will be developed per the I-Table as part of normal project management activities.) They are based on requirements in NASA Policy Directives (NPDs) and NASA Procedural Requirements (NPRs) that affect program/project planning. If a control plan is not applicable to a particular project, indicate that by stating it is not applicable in the appropriate section and provide a rationale. Control plans can either be a part of the Project Plan or separate stand-alone documents referenced in the appropriate part of the Project Plan. Considerations for determining if a control plan should be a stand-alone document include a requirement that the control plan be stand-alone in the NPR that requires the control plan; differences between when the control plan is baselined and when the Project Plan is baselined; how frequently the control plan will be updated since updates to the Project Plan require signatures; and how long the control plan is. When the control plan is a stand-alone document, the Project Plan contains a reference to the stand-alone document.

H.1.3 Each section of the Project Plan template is required. If a section is not applicable to a particular project, indicate by stating that in the appropriate section and provide a rationale. If a section is applicable but the project desires to omit the section or parts of a section, then a waiver or deviation needs to be obtained in accordance with the requirement tailoring process for

NPR 7120.5. If the format of the completed Project Plan differs from this template, a cross-reference table indicating where the information for each template paragraph is needs to be provided with the document when it is submitted for MDAA signature. Approvals are documented in Part 4.0, Waivers or Deviations Log, of the Project Plan. In addition, the project’s Compliance Matrix for this NPR is attached to the Project Plan.

H.1.4 The approval signatures of the MDAA, the Center Director, program manager, and project manager certify that the Project Plan implements all the Agency’s applicable institutional requirements or that the authority responsible for those requirements (e.g., Safety and Mission Assurance) have agreed to the modification of those requirements contained in the Project Plan.

H.1.5 Single-project programs may combine the Program and Project Plans into a single document if the MDAA agrees.

H.2 Project Plan Title Page

[*Project Name*] Project Plan

[*short title or acronym*]

(Provide a title for the candidate project and designate a short title or proposed acronym in parenthesis, if appropriate.)

_____ _____
Mission Directorate Associate Administrator Date

_____ _____
Center Director (as many signature lines as needed) Date

_____ _____
Program Manager Date

_____ _____
Project Manager Date

By signing this document, signatories are certifying that the content herein is acceptable as direction for managing this project and that they will ensure its implementation by those over whom they have authority.

Figure H-1 Project Plan Title Page

H.3 Project Plan Template

[Project Name] PROJECT PLAN

[short title or acronym]

1.0 PROJECT OVERVIEW

1.1 Introduction

Briefly describe the background of the project and its current status, including results of Formulation activities, decisions, and documentation. Document the project's category and NASA payload development risk classification (see NPR 8705.4, Risk Classification for NASA Payloads), as stated in the program requirements on the project.

Specify if there are plans for continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point.

1.2 Objectives

State the specific project objectives and high-level performance goals levied on the project by the program. Include performance, schedule, cost, and technology development objectives, as applicable. Identify program requirements and constraints on the project. Provide clear traceability to applicable Agency strategic goals.

1.3 Mission Description and Technical Approach

Describe briefly the mission and the mission design. Include mission objectives and goals, mission success criteria, and driving ground rules and assumptions affecting the mission and mission design. Identify key characteristics of the mission, such as launch date(s), flight plans, and the key phases and events on the mission timeline, including end of mission. For projects that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point, define the scope of the initial capability. Use drawings, figures, charts, etc., for clarification. Describe planned mission results, data archiving, and reporting.

Provide a brief description of the technical approach, including constituent launch, flight, and ground systems, operations concepts, and logistics concepts. Describe the systems to be developed (hardware and software), legacy systems, system interfaces, and facilities. Identify driving technical ground rules and assumptions, and major constraints affecting system development (e.g., cost, launch window, required launch vehicle, mission planetary environment, fuel/engine design, human systems integration, and international partners).

1.4 Project Authority, Governance Structure, Management Structure, and Implementation Approach

Describe the governance structure based on the project category. Specifically identify the Decision Authority and governing PMC responsible for oversight of the project and any delegated Decision Authority and delegated governing PMC, per Section 2.3 of NPR 7120.5, NASA Space Flight Program and Project Management Requirements.

Identify the Center where the project manager resides. Describe other Centers' responsibilities, if any. Describe the chain of accountability and decision path that outlines the roles and responsibilities of the project manager, program manager, Center Director, principal investigator, and project scientist, as appropriate, and other authorities as required per the project's categorization.

Define the relationships among various elements and organizations within the project structure,

including all stakeholders, team members, and supporting organizations. (This includes Technical Authorities.) Describe the project's approach for fostering effective upward and downward communication of critical management, technical, risk, and safety information. (This includes the Formal Dissent process.) Describe the process that the project will follow to communicate with the Center Management Council (CMC) and the Integrated Center Management Council (ICMC) if applicable. Describe briefly the process for problem reporting and subsequent decision making, clearly describing the roles and responsibilities of all organizations. Describe any use of special boards and committees.

Describe the project management structure consistent with the project Work Breakdown Structure (WBS), including organization and responsibilities, its integration with the parent program management structure, and NASA Center(s) participation. Describe clear lines of authority within the project team and between the project, the program office, the primary Center, the Mission Directorate, other participating Centers, and other participating organizations. Illustrate the organization graphically.

Describe briefly the implementation approach of the project, including any applicable guidance or direction from the Acquisition Strategy Meeting (ASM) review, the acquisition strategy (e.g., in-house, NASA Centers, and contractor primes), partners, and partner contributions, including innovative acquisition approaches such as commercial or other partners that will develop end products that are not owned by NASA but are provided as services to NASA, if appropriate. Describe briefly other program/project dependencies with NASA, other U.S. Government agencies, and international activities, studies, and agreements. Include make-or-buy decision plans and trade studies.

Identify and document concurrence for any investments, divestments, acquisition strategies, procurements, agreements, and changes to capability portfolio capability components in accordance with requirements and strategic guidance included in NPR 8600.1, NASA Capability Portfolio Management Requirements. (See Appendix A for definitions of capability portfolio and capability component.)

Document the agreements on the use of implementation policies and practices between the project manager and contributing NASA Centers in this section (or in appendices to the document), along with the project's approach to ensuring that interfaces do not increase risk to mission success.

1.5 Stakeholder Definition

Describe the stakeholders of the project (e.g., principal investigator (PI), science community, technology community, public, education community, parent program, and Mission Directorate sponsor) and the process to be used within the project to ensure stakeholder advocacy.

2.0 PROJECT BASELINES

Project baselines consist of a set of requirements, cost (including project-held UFE), schedule, and technical content that forms the foundation for program/project execution and reporting done as part of NASA's performance assessment and governance process. (For more detail, see

NPR 7120.5, Section 2.4, on baseline policy and documentation.)

2.1 Requirements Baseline

List or reference the requirements levied on the project by the program in the Program Plan and

discuss how these are flowed down to lower levels by summarizing the requirements allocation process. Reference requirements documents used by the project.

2.2 WBS Baseline

Provide the project's WBS and WBS dictionary to the Level 2 elements in accordance with the standard template below and guidance provided by the NASA Work Breakdown Structure (WBS) Handbook, NASA/SP-2010-3404, which can be found on the OCE tab under the "Other NASA-Level Documents" menu in NODIS. The WBS will support cost and schedule allocation down to a work package level; integrate both government and contracted work; integrate well with the EVMS approach; allow for unambiguous cost reporting; and be designed to allow project managers to monitor and control work package/product deliverable costs and schedule.

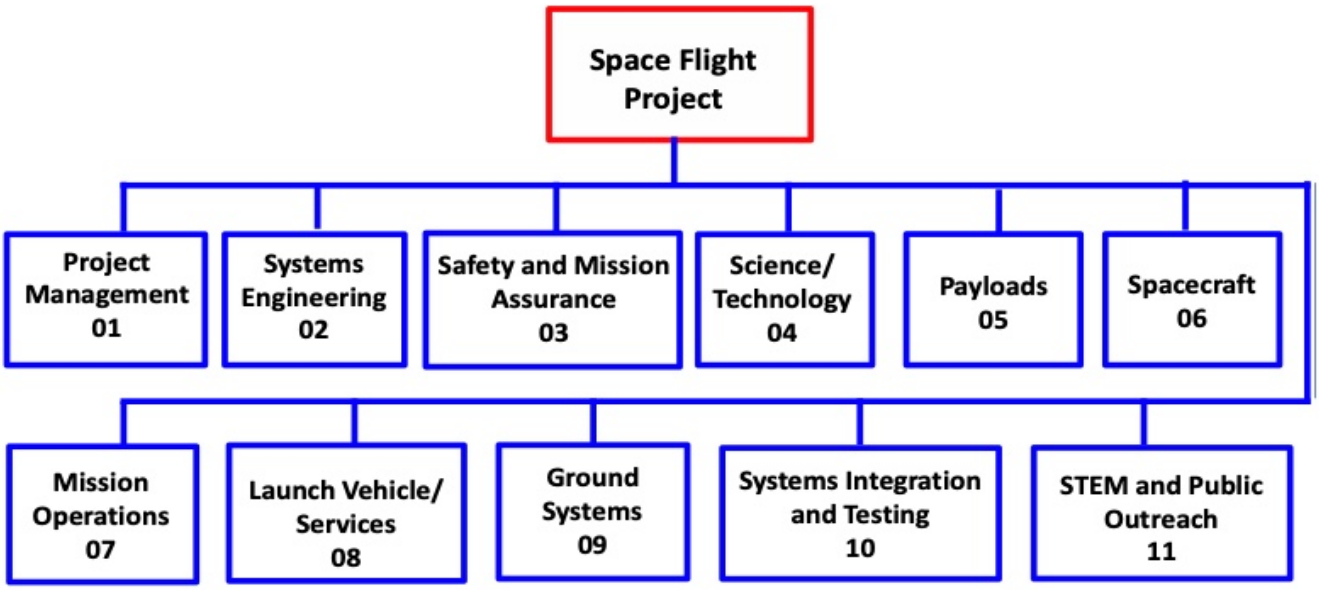

Figure H-2 Standard Level 2 WBS Elements for Space Flight Projects

2.3 Schedule Baseline

Present a summary of the project's IMS, including all critical milestones, major events, life-cycle reviews, and KDPs throughout the project life cycle. The summary of the master schedule should include the logical relationships (interdependencies) for the various project elements and critical paths, as appropriate. Identify driving ground rules, assumptions, and constraints affecting the schedule baseline.

2.4 Resource

Present the project funding requirements by fiscal year. State the New Obligation Authority (NOA) in real-year dollars for all years—prior, current, and remaining. The funding requirements are to be consistent with the project WBS and include funding for all cost elements required by the Agency's full-cost accounting procedures. Provide a breakdown of the project's funding requirements to the WBS Level 2 elements. Throughout the Implementation Phase, cost and schedule baselines are to be based on and maintained consistent with the approved joint cost and schedule confidence level, as applicable, in accordance with NPD 1000.5 and NPR 7120.5.

Present the project's workforce requirements by fiscal year, consistent with the project funding requirements and WBS. The workforce estimate is to encompass all work required to achieve project

objectives. Include the actual full-cost civil service and support contractor workforce by the organizations providing them for any prior fiscal years. Include full-cost civil service and support contractor workforce requirements by the organizations providing them for the current fiscal year and remaining fiscal years.

Describe the project's infrastructure requirements (acquisition, renovations, and/or use of real property/facilities, aircraft, personal property, and information technology). Identify means of meeting infrastructure requirements through synergy with other existing and planned programs and projects to avoid duplication of facilities and capabilities. Identify necessary upgrades or new developments, including those needed for environmental compliance.

Identify driving ground rules, assumptions, and constraints affecting the resource baseline.

2.5 Joint Cost and Schedule Confidence Level

For projects with an estimated life-cycle cost (LCC) initial capability cost greater than $250M, document the project's joint cost and schedule confidence level approved by the Decision Authority (DA) at KDP C. For projects with an estimated life-cycle cost greater than or equal to $1B, update the joint cost and schedule confidence level at CDR and at KDP D (if applicable).

3.0 PROJECT CONTROL PLANS

3.1 Technical, Schedule, and Cost Control Plan

This control plan documents the following:

Describe the plan to monitor and control the project requirements, technical design, schedule, and cost of the project to ensure that the high-level requirements levied on the project are met. (If this information is best documented in other control plans (e.g., the Systems Engineering Management Plan) then reference those control plans.)

Describe the project's performance measures in objective, quantifiable, and measurable terms and document how the measures are traced from the program requirements on the project. In addition, document the minimum mission success criteria associated with the program requirements on the project that, if not met, trigger consideration of a Termination Review.

The project also develops and maintains the status of a set of programmatic and technical leading indicators to ensure proper progress and management of the project. Status and trend of leading indicators should be presented at LCRs and KDPs. These leading indicators include:

• Requirement Trends (percent growth, TBD/TBR closures, number of requirement changes).

- Interface Trends (percent ICD approval, TBD/TBR burn down, number of interface requirement changes).
- Verification Trends (closure burn down, number of deviations/waivers approved/open).
- Review Trends (RID/RFA/Action Item burn down per review).
- Software Unique Trends (number of requirements per build/release versus plan).
- Problem Report/Discrepancy Report Trends (number open, number closed).
- Cost Trends (Plan vs. actual, UFE, EVM).
- Schedule Trends (critical path slack/float, critical milestone dates).
- Staffing Trends (FTE/WYE plan vs. actual).
- Technical Performance Measures (Mass margin, power margin).

- Manufacturing Trends (Number of nonconformance/corrective actions (open/closed/resolved)).
- Additional project-specific indicators as needed.

These indicators are further explained in the NASA Space Flight Program and Project Management Handbook, NASA/SP-2014-3705; the NASA Project Planning and Control Handbook, NASA/SP-2016-3424; and the NASA Common Leading Indicators Detailed Reference Guide at https://nodis3.gsfc.nasa.gov/OCE_rep/OCE_list.cfm.

Describe the approach to monitor and control the project's Agency Baseline Commitment (ABC). Describe how the project will periodically report performance. Describe mitigation approach if the project is exceeding the development cost documented in the ABC to take corrective action prior to triggering the 30 percent breach threshold. Describe how the project will support a rebaseline review in the event the Decision Authority directs one.

Describe the project's implementation of Technical Authority (Engineering, Health and Medical, and Safety and Mission Assurance).

Describe how the project will implement the SI and other systems of measurement and the identification of units of measure in all product documentation. Where full implementation of the SI system of measurement is not practical, hybrid configurations (i.e., a controlled mix of SI and non-SI system elements) may be used to support maximum practical use of SI units for design, development, and operations. Where hybrid configurations are used, describe the specific requirements established to control interfaces between elements using different measurement systems. (See NPR 7120.5, Section 3.7, for SI assessment timing requirement.)

Describe the project's implementation of Earned Value Management (EVM) including:

- How the PMB will be developed and maintained for the project and how UFE will be established and controlled;
- The methods the project will use to authorize the work and to communicate changes for the scope, schedule, and budget of all suppliers; how the plan is updated as make-buy decisions and agreements are made;
- The process to be used by the project to communicate the time-phased levels of funding that have been forecast to be made available to each supplier;
- For the class of suppliers not required to use EVM, the schedule and resource information required of the suppliers to establish and maintain a baseline and to quantify schedule and cost variances; how contractor performance reports will be required; and
- How the cost and schedule data from all partners/suppliers will be integrated to form a total project-level assessment of cost and schedule performance.

Describe any additional specific tools necessary to implement the project's control processes (e.g., the requirements management system, project scheduling system, project information management systems, budgeting, and cost accounting system).

Describe the process for monitoring and controlling the IMS.

Describe the process for utilizing the project's technical and schedule margins and UFE to meet the Management and Commitment Baselines.

Describe how the project plans to report technical, schedule, and cost status to the program manager, including the frequency and level of detail of reporting.

Describe the project's internal processes for addressing technical waivers and deviations and handling Formal Dissents.

Describe the project's descope plans, including key decision dates and savings in cost and schedule, and show how the descopes are related to the project's threshold performance requirements.

Include a description of the systems engineering organization and structure and how the Project Chief Engineer (PCE) executes the overall systems engineering functions.

3.2 Safety and Mission Assurance Plan

Develop a project Safety and Mission Assurance (SMA) Plan as required by NPR 8705.2, Human-Rating Requirements for Space Systems for crewed missions and NPR 8705.4, Risk Classification for NASA Payloads for un-crewed missions and payloads.

The SMA Plan reflects a project life-cycle SMA process perspective, addressing areas including: SMA domain management and SMA domain integration (e.g., for safety, reliability, maintainability, quality, planetary protection, etc.) with other engineering and management functions (e.g., concept and design trade-studies, risk analysis and risk assessments, risk-informed decision making, fault tolerance and contingency planning, knowledge capture, hardware and software design assurance, supply chain risk management and procurement, hardware and software design verification and test, manufacturing process design and control, manufacturing and product quality assurance, system verification and test, pre-flight verification and test, operations, maintenance, logistics planning, maintainability and sustainability, operational reliability and availability, decommissioning, and disposal).

Describe how the project will develop and manage a Closed-Loop Problem Reporting and Resolution System. Describe how the project develops, tracks, and resolves problems. The process should include a well-defined data collection system and process for hardware and software problems and anomaly reports, problem analysis, and corrective action.

Identify the project's approach to flow down requirements as appropriate to external developers and suppliers in acquisitions (e.g., contracts and purchase orders).

Describe how the project will develop, evaluate, and report indications of SMA program maturity and effectiveness at life cycle or other executive reviews, including through the use of metrics and indicators that are not otherwise included in formal life-cycle review deliverables or are not elements of the certification of flight readiness (COFR) process (e.g., satisfactory progress towards human rating).

3.3 Risk Management Plan

Develop a Risk Management Plan that includes the content required by NPR 8000.4, Agency Risk Management Procedural Requirements. Summarize how the project will implement a risk management process (including risk-informed decision making (RIDM) and continuous risk management (CRM) in accordance with NPR 8000.4, Agency Risk Management Procedural Requirements). Include the initial Significant Risk List and appropriate actions to mitigate each risk. Projects with international or other U.S. Government agency contributions need to plan for, assess, and report on risks due to international or other government partners and plan for contingencies.

3.4 Acquisition Strategy

The project Acquisition Strategy is developed by the project manager, supported by the host Center's Procurement Officer, and needs to be consistent with NPD 1000.5, Policy for NASA Acquisition, the results of the Agency strategic acquisition process, and the ASM. It documents an integrated acquisition strategy that enables the project to meet its mission objectives and provides the best value to NASA. The Acquisition Strategy should include, but is not limited to, the following:

Identify all major proposed acquisitions (such as engineering design study, hardware and software development, mission and data operations support, and sustainment) in relation to the project WBS. Provide summary information on each such proposed acquisition, including a Contract WBS; major deliverable items; recommended type of procurement (competitive, AO for instruments); type of contract (cost-reimbursable, fixed-price); source (institutional, contractor, other U.S. Government agency, or international organization); procuring activity; and surveillance approach. Identify those major procurements that require a PSM.

Describe completed or planned studies supporting 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.

Describe the supply chain and identify potential critical and single-source suppliers needed to design, develop, produce, support, and, if appropriate, restart an acquisition program or project. The acquisition strategy should promote sufficient program/project stability to encourage industry to invest, plan, and bear their share of risk. Describe the internal and external mechanisms and procedures used to identify, monitor, and mitigate supply chain risks. Include data reporting relationships to allow continuous surveillance of the supply chain that provides for timely notification and mitigation of potential risks. Describe the process for reporting supply chain risks to the program.

Identify the project's approach to strengthen safety and mission assurance in contracts.

Describe all agreements, memoranda of understanding, barters, in-kind contributions, and other arrangements for collaborative and/or cooperative relationships. Include partnerships created through mechanisms other than those prescribed in the FAR and NFS. List all such agreements (the configuration control numbers, the date signed or projected dates of approval, and associated record requirements) necessary for project success. Include or reference all agreements concluded with the authority of the project manager and reference agreements concluded with the authority of the program manager and above. Include the following:

(1) NASA agreements (e.g., space communications, launch services, and inter-Center memoranda of agreement).

(2) Non-NASA agreements:

(a) Domestic (e.g., U.S. Government agencies).

(b) International (e.g., memoranda of understanding).

Describe intellectual property considerations and goals for advanced technologies to protect core NASA interests during the project life cycle; the process for respecting and protecting privately developed intellectual property; the process for ensuring acquisition strategies, proposals, and contract awards reflect intellectual property considerations established for the project; the approach for ensuring that the intellectual property strategy promotes competition for post-production

sustainment/modernization contracts; the approach for seeking flexible and creative solutions to intellectual property issues that meet the desires of the parties and reflect NASA's investment; the approach for ensuring procurement contracts specify both (1) the delivery of necessary technical data and computer software and (2) the license rights necessary for technical data and computer software; and the approach for ensuring the delivery of technical data and computer software under procurement contracts is marked in accordance with the contract at the time of delivery.

3.5 Technology Development Plan

Describe the technology assessment, development, management, and acquisition strategies (including intellectual property considerations) needed to achieve the project's mission objectives.

Describe how the project will assess its technology development requirements, including how the project will evaluate the feasibility, availability, readiness, cost, risk, and benefit of the new technologies. The approach should include timely reporting of new technologies to the Center Technology Transfer Office and supporting technology transfer activities as described in NPR 7500.2, NASA Technology Transfer Requirements.

Describe how the project will identify opportunities for leveraging on-going technology efforts.

Describe how the project will transition technologies from the development stage to the manufacturing and production phases. Identify the supply chain needed to manufacture the technology and any costs and risks associated with the transition to the manufacturing and production phases. Develop and document appropriate mitigation plans for the identified risks.

Describe the project's strategy for ensuring that there are alternative development paths available if/when technologies do not mature as expected. (Refer to NPR 7123.1 for TRL definitions and SP-20205003605, Technology Readiness Assessment Best Practices Guide. The Technology Readiness Assessment Best Practices Guide can be found in NODIS on the OCE tab under the "Other NASA-Level Documents" menu.)

Describe how the project will remove technology gaps, including maturation, validation, and insertion plans, performance measurement at quantifiable milestones, off-ramp decision gates, and resources required.

Describe briefly how the project will ensure that all planned technology exchanges, contracts, and partnership agreements comply with all laws and regulations regarding export control and the transfer of sensitive and proprietary information.

Describe how the project will transition technologies from the development stage to manufacturing, production, and insertion into the end system. Identify any potential costs and risks associated with the transition to manufacturing, production, and insertion. Develop and document appropriate mitigation plans for the identified risks.

3.6 Systems Engineering Management Plan

Develop a SEMP that includes the content required by NPR 7123.1, NASA Systems Engineering Processes and Requirements. Include descriptions of the project's overall approach for systems engineering to include system design and product realization processes (implementation and/or integration, verification and validation, and transition), as well as the technical management processes.

3.7 System Security Plan

Identify and prepare a System Security Plan for each information system. The System Security Plan is a formal document that provides an overview of the security requirements for an information system and describes the security controls in place or planned for meeting those requirements.

System Security Plans are generated and stored within the NASA Risk Information and Security Compliance System (RISCS) at https://riscs-info.nasa.gov/. Multiple systems may be covered under a single System Security Plan. Controls selected within the System Security Plan are included as system requirements for the system or systems covered by the plan.

Document the project's approach to implementing cybersecurity requirements in accordance with NPR 2810.1, Security of Information Technology, if there are requirements outside the scope of the System Security Plan(s).

3.8 Software Management Plan

Develop a Software Management Plan that includes the content required by NPR 7150.2, Software Engineering Requirements. Additional information on the plan can be found in NASA-STD-8739.8, Software Assurance and Software Safety Standard. Summarize how the project will develop and/or manage the acquisition of software required to achieve project and mission objectives. The Software Management Plan should be coordinated with the Systems Engineering Management Plan.

3.9 Verification and Validation Plan

Summarize the approach for performing verification and validation of the project products. Indicate the methodology to be used in the verification/validation (test, analysis, inspection, or demonstration), as defined in NPR 7123.1, NASA Systems Engineering Processes and Requirements.

3.10 Review Plan

Summarize the project's approach for conducting a series of reviews, including internal reviews and project life-cycle reviews. In accordance with Center best practices, program review requirements, and the requirements in NPR 7123.1, NASA Systems Engineering Processes and Requirements and NPR 7120.5, NASA Space Flight Program and Project Management Requirements, provide the names, purposes, content, and timing of the life-cycle reviews.

Identify any deviations from these documents that the project is planning or waivers that have been granted, including tailoring to accommodate aspects of innovative acquisition approaches. Provide the technical, scientific, schedule, cost, and other criteria that will be utilized in the consideration of a Termination Review.

For projects that plan continuing operations and production, including integration of capability upgrades, with an unspecified Phase E end point, define the initial capability in the Review Plan for KDP B if the initial capability is not the first operational mission flight.

For projects that are part of tightly coupled programs, project life-cycle reviews and KDPs should be planned in accordance with the project life cycle and KDP sequencing guidelines in the Program Plan. Document the sequencing of each project life-cycle review and KDP with respect to the associated Program life-cycle review and KDP. In addition, document which project KDPs should be conducted simultaneously with other projects' KDPs and which project KDPs should be conducted simultaneously with the associated program KDPs.

The sequencing of project life-cycle reviews and KDPs with respect to program life-cycle reviews and KDPs is especially important for project PDR life-cycle reviews that precede KDP Cs. At KDP C, the Agency makes project technical, cost, and schedule commitments to its external stakeholders at the established JCL in accordance with NPR 7120.5 requirements. Since changes to one project can easily impact other projects' technical, cost, schedule, and risk baselines, projects and their program may need to proceed to KDP C/KDP I together.

3.11 Mission Operations Plan

Describe the activities required to perform the mission. Describe how the project will implement the associated facilities, hardware, software, and procedures required to complete the mission. Describe mission operations plans, rules, and constraints. Describe the Mission Operations System (MOS) and Ground Data System (GDS) in the following terms:

- MOS and GDS human resources and training requirements.
- Procedures to ensure that operations are conducted in a reliable, consistent, and controlled manner using lessons learned during the program and from previous programs.
- Facilities requirements (offices, conference rooms, operations areas, simulators, and test beds).
- Hardware (ground-based communications and computing hardware and associated documentation).
- Software (ground-based software and associated documentation).

3.12 NEPA Compliance Documentation

Describe the level of NEPA analysis planned to comply with NPR 8580.1, Implementing the National Environmental Policy Act, and Executive Order 12114. The NEPA Compliance Documentation should be prepared based on consultation with the appropriate NEPA manager (Center NEPA Manager or Mission Direction NEPA Liaison) and describe the project's NEPA strategy at all affected Centers, including decisions regarding programmatic NEPA documents. Insert into the project schedule the critical NEPA milestones if preparation of an Environmental Assessment or Environmental Impact Statement is planned.

3.13 Integrated Logistics Support Plan

Describe how the project will implement NPD 7500.1, Program and Project Life-Cycle Logistics Support Policy, including a maintenance and support concept; participation in the design process to enhance supportability; supply support; maintenance and maintenance planning; packaging, handling, and transportation; technical data and documentation; support and test equipment; training; manpower and personnel for ILS functions; facilities required for ILS functions; and logistics information systems for the life of the project.

3.14 Science Data Management Plan

Describe how the project will manage the scientific data generated and captured by the operational mission(s) and any samples collected and returned for analysis. Include descriptions of how data will be generated, processed, distributed, analyzed, and archived, as well as how any samples will be collected, stored during the mission, and managed when returned to Earth. The Plan should include definition of data rights and services and access to samples, as appropriate. Identify where the preliminary science data requirements will be documented (these requirements should be documented by SRR). The Plan should be developed in consultation with the Directorate data leads and the Office of the Chief Information Officer (OCIO) early in the project life-cycle to ensure that metadata standards and data formats are appropriately considered and that infrastructure and security

requirements are addressed.

Explain how the project will accomplish the information management and disposition in NPD 2200.1, Management of NASA Scientific and Technical Information; NPR 2200.2, Requirements for Documentation, Approval and Dissemination of Scientific and Technical Information; and NPR 1441.1, NASA Records Management Program Requirements, as applicable to project science data.

Explain how the project will implement NASA sample handling, curation, and planetary protection directives and rules, including NPR 8020.12, Planetary Protection Provisions for Robotic Extraterrestrial Missions.

3.15 Integration Plan

Prepare an integration plan that defines the integration and verification strategies for a project interface with the system design and decomposition into the lower-level elements. The integration plan is structured to bring the elements together to assemble each subsystem and to bring all the subsystems together to assemble the system/product. The primary purposes of the integration plan are: (1) to describe this coordinated integration effort that supports the implementation strategy, (2) to describe for the participants what needs to be done in each integration step, and (3) to identify the required resources and when and where they will be needed.

3.16 Configuration Management Plan

Describe the configuration management (CM) approach that the project team will implement. Describe the CM planning and management function including the CM organization and tools to be used. Describe the methods and procedures to be used for configuration identification, configuration control, interface management, configuration change management, configuration verification and audit, and configuration status accounting and communications. Describe how CM will be audited and how contractor CM processes will be integrated with the project. Configuration Management should address hardware, software, and firmware. Additional information on configuration management is provided in NPR 7123.1 and SAE/EIA 649, Standard for Configuration Management.

3.17 Security Plan

Describe the project's plans for ensuring security, including:

Security Requirements: Describe the project's approach for planning and implementing the requirements for physical, personnel, and industrial security and for security awareness/education requirements in accordance with NPR 1600.1, NASA Security Program Procedural Requirements.

Emergency Response Requirements: Describe the project's emergency response plan in accordance with NPR 1040.1, NASA Continuity of Operations (COOP) Planning Procedural Requirements and define the range and scope of potential crises and specific response actions, timing of notifications and actions, and responsibilities of key individuals.

3.18 Project Protection Plan

Ensure that a Project Protection Plan is completed according to the schedule identified in product maturities, as documented in Appendix I of NPR 7120.5. The project Protection Plan is approved by the Mission Directorate's designated approval authority, and the implementing Center's engineering Technical Authority.

The Project Protection Plan assesses applicable adversarial threats to the project or system (including support systems, development environments, and external resources), identifies system susceptibilities, potential vulnerabilities, countermeasures, resilience strategies, and risk mitigations. The results inform the project's or system's design and concept of operations, in context with the project's or system's requirements. The Project Protection Plan addresses NASA-STD-1006, Space System Protection Standard, in accordance with NPR 1058.1, NASA Enterprise Protection Program, and includes inputs from threat intelligence, candidate protection strategies provided by OCE, and other applicable standards. The project team assesses adversarial threats with support from the Office of Protective Services' Intelligence Division and the Office of the Chief Engineer and requires access to Classified National Security Information.

Since protection measures can be implemented either by designing the project's or system's architecture to be more resilient or by enhancing the capabilities provided by institutional security providers, it is important that the document identify to institutional security providers (both internal and external to NASA) the critical nodes and single points-of-failure in the project or system. The project System Security Plan (see Section 3.7 above) and Security Plan (see Section 3.17) should address how institutional security measures are implemented on each project to protect its critical nodes.

Risk scenarios emerging from the project Protection Plan analysis are tracked in accordance with the project's Risk Management Plan. (See Section 3.3 above.)

Project Protection Plans provide technical information on NASA space systems to specific commands and agencies in the Department of Defense and Intelligence Community to assist those organizations in providing timely support to NASA in the event of an incident involving a NASA mission.

3.19 Technology Transfer (formerly Export) Control Plan

Describe how the project will implement the export control requirements specified in

NPR 2190.1, NASA Export Control Program.

3.20 Knowledge Management Plan

Describe the project's approach to creating the knowledge management strategy and processes. Strategy should include practices for identifying, capturing and transferring knowledge and capturing and documenting lessons learned throughout the project life cycle as authorized in NPD 7120.4, NASA Engineering and Program/Project Management Policy and as described in NPD 7120.6, Knowledge Policy for Programs and Projects and other appropriate requirements and standards documentation.

3.21 Human Rating Certification Package

For human space flight missions, develop a Human Rating Certification Package per

NPR 8705.2, Human-Rating Requirements for Space Systems. Human rating certification focuses on the integration of the human into the system, preventing catastrophic events during the mission, and protecting the health and safety of humans involved in or exposed to space activities, specifically the public, crew, passengers, and ground personnel.

3.22 Planetary Protection Plan

Prepare a plan that specifies management aspects of the planetary protection activities of the project. Planetary protection encompasses: (1) the control of terrestrial microbial contamination associated with space vehicles intended to land, orbit, flyby, or otherwise encounter extraterrestrial solar system bodies, and (2) the control of contamination of the Earth by extraterrestrial material collected and returned by missions. The scope of the plan contents and level of detail will vary with each project based upon the requirements in NASA policies

NPR 8020.12, Planetary Protection Provisions for Robotic Extraterrestrial Missions, and NPD 8020.7, Biological Contamination Control for Outbound and Inbound Planetary Spacecraft.

3.23 Nuclear Launch Authorization Plan

Prepare a nuclear launch authorization plan for any U.S. space mission involving the use of radioactive materials. Procedures and levels of review and analysis required for nuclear launch authorization vary with the quantity of radioactive material planned for use and potential risk to the general public and the environment. NPR 8715.3, NASA General Safety Program Requirements specifies the safety guidelines for the launch of spacecraft containing space nuclear systems.

3.24 Range Safety Risk Management Process Documentation

Develop documentation that details a vehicle program's Range Safety Risk Management process in accordance with NPR 8715.5, Range Flight Safety Program. This applies to launch and entry vehicle programs, scientific balloons, sounding rockets, drones and Unmanned Aircraft Systems. This does not apply to programs developing a payload that will fly on board a vehicle. The range flight safety concerns associated with a payload are addressed by the vehicle's range flight safety process. The focus is on the protection of the public, workforce, and property during range flight operations.

3.25 Payload Safety Process Deliverables

Develop the payload safety process deliverables in accordance with NPR 8715.7, Payload Safety Program. This applies to NASA projects involving design, fabrication, testing, integration, processing, launch, and recovery of payloads and the design of ground support equipment (GSE) used to support payload-related operations during prelaunch operations and during recovery. Included are items such as free-flying automated spacecraft, Space Launch System payloads, Space Station payloads, expendable launch vehicle payloads, flight hardware and instruments designed to conduct experiments, and payload support equipment. NASA-STD-8719.24, NASA Expendable Launch Vehicle Payload Safety Requirements, provides more details on payload processing for launch.

3.26 Communications Plan

Develop a Communications Plan in collaboration with the Associate Administrator for the Office of Communications or their designee that identifies key project milestones that will be of interest to the general public, the media, and other key stakeholders and plans to engage these audiences via audio and real and/or near real-time high resolution video and/or imagery for each milestone including during full mission operations. Summarize how these efforts will promote understanding of and engagement with project objectives, elements, benefits, and contributions to overarching NASA goals. In collaboration with the Associate Administrator for the Office of Communications or their designee, identify resources and technical requirements for implementation of communications for the general public, media, and other key stakeholders. (See the Communications Plan Template (on the Web site for the Office of Communications, http://communications.nasa.gov/content/nasa-comm-guidelines.)

3.27 Quality Assurance Surveillance Plan

Develop a consolidated set of detailed instructions for the performance of Government contract quality assurance review and evaluation for the project. The plan might include contractor documents, data, and records; products and product attributes; processes; quality system elements/attributes; and requirements related to quality data analysis, nonconformance reporting and corrective action tracking/resolution, and final product acceptance. (See NASA-STD-8709.22, Safety and Mission Assurance Acronyms, Abbreviations, and Definitions.)

3.28 Orbital Collision Avoidance Plan

Describe how the project implements the design considerations and preparation for operations to avoid in-space collisions. The plan ensures the space flight mission meets the requirements of NID 7120.132, Collision Avoidance for Space Environment Protection. Include in the plan a project overview including a concept of operation, how orbit selection was performed, the spacecraft's ascent and descent plan, how the spacecraft's location tracking data will be generated, and whether there will be any autonomous flight control. Discuss how the spacecraft's design will enable it to be acquired and tracked by the Space Surveillance Network and be cataloged by the U.S. Space Command. Describe the process to routinely coordinate with other operator(s) for maneuvering. Appendix C of the NID provides a template for this plan. (See NID 7120.132, Collision Avoidance for Space Environment Protection for more detail and plan template.)

3.29 Human Systems Integration Plan

Develop a Human Systems Integration (HSI) Plan that describes how human systems integration and human centered design will be integrated into the project design process and life cycle, including what types of human systems integration resources, tools, analysis, testing, and products will be employed or developed to ensure successful human systems integration, thereby reducing mission risk and total life-cycle or initial capability cost, while increasing overall safety. The plan also describes roles and responsibilities related to implementation of HSI. (See the NASA Human Systems Integration (HSI) Handbook, NASA/SP-20210010952, for additional information.)

4.0 WAIVERS OR DEVIATIONS LOG

Identify NPR 7120.5 requirements for which a waiver or deviation has been requested and approved consistent with project characteristics such as scope, complexity, visibility, cost, safety, and acceptable risk, and provide rationale and approvals.

5.0 CHANGE LOG

Track and document changes to the Project Plan.

6.0 APPENDICES

Appendix A. Acronyms
Appendix B. Definitions
Appendix C. Compliance Matrix for this NPR

Appendix I. Program and Project Products by Phase

I.1 Product Owner and Requirement or Best Practice:

a. The Product Owner for each product is indicated in the column titled “Product Owner/Requirement or Best Practice.

b. Products listed in the I-Tables are either requirements or best practices.

c. “R” in the Product Owner/Requirement or Best Practice column indicates that a product is a requirement. Products that are requirements are included in the Compliance Matrix in Appendix C.

d. “BP” in the Product Owner/Requirement or Best Practice column indicates that the product is considered a best practice. The expectation is that the product will be developed per the I-Table as part of normal program management activities.

I.2 For non-configuration-controlled documents, the following terms and definitions are used in tables I-1 through I-7:

a. “Initial” is applied to products that are continuously developed and updated as the program or project matures.

b. “Final” is applied to products that are expected to exist in this final form (e.g., minutes and final reports).

c. “Summary” is applied to products that synthesize the results of work accomplished.

d. “Plan” is applied to products that capture work that is planned to be performed in the following phases.

e. “Update” is applied to products that are expected to evolve as the formulation and implementation processes evolve. Only expected updates are indicated. However, any document may be updated, as needed.

I.3 For configuration-controlled documents, the following terms and definitions are used in tables I-1 through I-7:

a. “Preliminary” is the documentation of information as it stabilizes but before it goes under configuration control. It is the initial development leading to a baseline. Some products will remain in a preliminary state for multiple LCRs. The initial preliminary version is likely to be updated at subsequent LCRs but remains preliminary until baselined.

b. “Baseline” indicates putting the product under configuration control so that changes can be tracked, approved, and communicated to the team and any relevant stakeholders. The expectation on products labeled “baseline” is that they will be at least final drafts going into the designated LCR and baselined coming out of the LCR. Baselining of products that will eventually become part of the Program or Project Plan indicates that the product has the concurrence of stakeholders and is under configuration control. Updates to baselined documents require the same formal approval process as the original baseline.

c. “Approve” is used for a product, such as Concept Documentation, that is not expected to be put under classic configuration control but still requires that changes from the “Approved” version are documented at each subsequent “Update.”

d. “Update” is applied to products that are expected to evolve as the formulation and implementation processes evolve. Only expected updates are indicated. However, any document may be updated, as needed. Updates to baselined documents require the same formal approval process as the original baseline.

I.4 Control Plans (Tables I-1 (Program Plan Control Plans), I-3, I-5, and I-7):

a. Control plans can either be part of the Program or Project Plan or separate stand-alone documents referenced in the appropriate part of the Program or Project Plan.

b. Considerations for determining if a control plan should be a stand-alone document include a requirement that the control plan be stand-alone in the NPR that requires the control plan; differences between when the control plan is baselined and when the Program or Project Plan is baselined; how frequently the control plan will be updated since updates to the Program or Project Plan require signatures; and how long the control plan is.

c. When the control plan is a stand-alone document, the Program or Project Plan contains a reference to the stand-alone document.

1.5 Formats for Non-Control Plan I-Table Products

a. Unless a specific form, format, document, or document template is identified by the NPR that requires an I-Table product, the documentation format is flexible (e.g., LCR or KDP presentation charts or as part of a document such as the Program or Project Plan).

Table I-1 Uncoupled and Loosely Coupled Program Milestone Products and Control Plans Maturity Matrix

Products	Product Owner/Requirement or Best Practice	Formulation		Implementation
		KDP I1		KDP II - n
		SRR	SDR	PIR
1. FAD [Required per NPR 7120.5]	OCE/R	Baseline		
2. PCA [Required per NPR 7120.5]	OCE/R	Preliminary	Baseline	
3. Program Plan [Required per NPR 7120.5]	OCE/R	Preliminary	Baseline	Update
3.a. Mission Directorate requirements and constraints [Required per NPR 7123.1]	OCE/R	Baseline	Update	
3.b. Traceability of program-level requirements on projects to the Agency strategic goals and Mission Directorate requirements and constraints [Required per NPR 7123.1]	OCE/R	Preliminary	Baseline	
3.c. Documentation of driving ground rules and assumptions on the program [Required per NPR 7120.5}	OCE/R	Preliminary	Baseline	
4. Interagency and international agreements	OCE/R	Preliminary	Baseline	
5. ASM Decision Memorandum or ASM meeting summary [additional information in NPD 1000.5]	OCE/R		Final	
6. Risk mitigation plans and resources for significant risks [Required by NPR 7120.5]	OCE/R	Initial	Update	Update
7. Documented Cost and Schedule Baselines [Required per NPR 7120.5]	OCFO-SID/R	Preliminary	Baseline	Update

8. Documentation of Basis of Estimate (cost and schedule) [Required per NPR 7120.5]	OCFO-SID/R	Preliminary	Baseline	Update
9. Documentation of performance against plan/baseline, including status/closure of formal actions from previous KDP [Required by NPR 7120.5]	OCE/R	Summary	Summary	Summary
10. Industrial Base and Supply Chain Risk Management (SCRM) Strategy and Status [Required per NPR 8735.2]	OSMA/R	Preliminary	Baseline	Update
Program Plan Control Plans				
1. Technical, Schedule, and Cost Control Plan [Required per NPR 7120.5]	OCE/R	Preliminary	Baseline	
2. Safety and Mission Assurance Plan [Required per NPRs 8705.2 and 8705.4]	OSMA/R	Preliminary	Baseline	
3. Risk Management Plan [Required per NPR 8000.4]	OSMA/R	Preliminary	Baseline	
4. Acquisition Strategy [Required per NPD 1000.5]	OCE/R	Preliminary	Baseline	
5. Technology Development Plan [additional information in NPR 7500.2, NPR 7123.1, and NPR 7120.5]	OCE/BP	Preliminary	Baseline	
6. Systems Engineering Management Plan [Required per NPR 7123.1]	OCE/R	Preliminary	Baseline	
7. System Security Plan [Required per NPR 2810.1]	OCIO/R	Preliminary	Baseline	Update
8. Review Plan [Required per NPR 7120.5]2	OCE/R	Baseline	Update	
9. NEPA Compliance Documentation [Required per NPR 8580.1]	OSI-EMD/R		Baseline	
10. Configuration Management Plan [Required per NPR 7120.5; additional information in NPR 7123.1 and SAE/EIA 649]	OCE/R		Baseline	
11. Security Plan [Required per NPR 1040.1 and NPR 1600.1]	OPS/R		Baseline	
12. Technology Transfer (formerly Export) Control Plan [Required per NPR 2190.1]	OIIR/R		Baseline	
13. Communications Plan [additional information in NPR 7120.5]	OComm/BP	Preliminary	Baseline	
14. Knowledge Management Plan [additional information in NPD 7120.4 and NPD 7120.6]	OCE/BP	Preliminary	Baseline	
15. Quality Assurance Surveillance Plan [Required per NPR 8735.2 and NASA FAR Supplement part 1837.604]	OSMA/R	Preliminary	Baseline	Update

1 If desired, the Decision Authority may request a KDP 0 be performed generally following SRR.
2 Review Plan should be baselined before the first review.

Table I-2 Tightly Coupled Program Milestone Products Maturity Matrix

Products	Product Owner/Requirement or Best Practice	Formulation			Implementation				
				KDP 0	KDP I	KDP II		KDP III	KDP n
		SRR	SDR	PDR	CDR	SIR	ORR	MRR/FRR	DR
1. FAD [Required per NPR 7120.5]	OCE/R	Baseline							
2. PCA [Required per NPR 7120.5]	OCE/R		Preliminary	Baseline					
3. Program Plan [Required per NPR 7120.5]	OCE/R	Preliminary	Baseline	Update	Update	Update	Update	Update	Update

3.a. Mission Directorate requirements and constraints [Required per NPR 7123.1]	OCE/R	Baseline	Update	Update					
3.b. Traceability of program-level requirements on projects to the Agency strategic goals and Mission Directorate requirements and constraints [Required per NPR 7123.1]	OCE/R	Preliminary	Baseline	Update					
3.c. Documentation of driving ground rules and assumptions on the program [Required per NPR 7120.5]	OCE/R	Preliminary	Baseline	Update	Update	Update			
4. Interagency and international agreements	OCE/R	Preliminary	Baseline	Update					
5. ASM Decision Memorandum or ASM meeting summary [additional information in NPD 1000.5]	OCE/R		Final						
6. Risk mitigation plans and resources for significant risks [Required by NPR 7120.5]	OCE/R	Initial	Update	Update	Update	Update	Update	Update	Update
7. Documented Cost and Schedule Baselines [Required per NPR 7120.5]	OCFO-SID/R	Preliminary	Preliminary	Baseline	Update	Update	Update	Update	Update
8. Documentation of Basis of Estimate (cost and schedule) [Required per NPR 7120.5]	OCFO-SID/R	Preliminary	Preliminary	Baseline	Update	Update	Update	Update	Update
9. CADRe [Required by NPR 7120.5]	OCFO-SID/R	Baseline	Update	Update	Update	Update		Update1	Update
10. Shared Infrastructure2, Staffing, and Scarce Material Requirements and Plans	OCE/R	Initial	Update	Update	Update				
11. Documentation of performance against plan/baseline, including status/closure of formal actions from previous KDP [Required by NPR 7120.5]	OCE/R		Summary	Summary	Summary	Summary	Summary	Summary	Summary

12. Industrial Base and Supply Chain Risk Management (SCRM) Strategy and Status [Required per NPR 8735.2]	OSMA/R	Preliminary	Baseline	Update	Update				
1 The CADRe for MRR/FRR is considered the "Launch CADRe" to be completed after the launch. 2 Shared infrastructure includes facilities that are required by more than one of the program's projects.									

Table I-3 Tightly Coupled Program Plan Control Plans Maturity Matrix

(See Appendix G Template for Control Plan Details.)	Product Owner/Requirement or Best Practice	Formulation			Implementation				
			KDP 0	KDP I	KDP II		KDP III		KDP n
		SRR	SDR	PDR	CDR	SIR	ORR	MRR/FRR	DR
1. Technical, Schedule, and Cost Control Plan [Required per NPR 7120.5]	OCE/R	Preliminary	Baseline	Update					
2. Safety and Mission Assurance Plan [Required per NPRs 8705.2 and 8705.4]	OSMA/R	Preliminary	Baseline	Update	Update			Update (SMSR)	
3. Risk Management Plan [Required per NPR 8000.4]	OSMA/R	Preliminary	Baseline	Update					
4. Acquisition Strategy [Required per NPD 1000.5]	OCE/R	Preliminary Strategy	Baseline	Update					
5. Technology Development Plan [additional information in NPR 7500.2, NPR 7123.1, and NPR 7120.5]	OCE/BP	Preliminary	Baseline	Update					
6. Systems Engineering Management Plan [Required per NPR 7123.1]	OCE/R	Preliminary	Baseline						
7. Verification and Validation Plan [Required per NPR 7120.5, additional information in NPR 7123.1]	OCE/R		Preliminary	Baseline	Update	Update			
8. System Security Plan [Required per NPR 2810.1]	OCIO/R	Preliminary		Update	Baseline	Update	Update		
9. Review Plan [Required per NPR 7120.5]1	OCE/R	Baseline	Update	Update					
10. Mission Operations Plan [Required per NPR 7120.5]	OCE/R					Preliminary	Baseline	Update	
11. NEPA Compliance Documentation [Required per NPR 8580.1]	OSI-EMD/R		Preliminary	Baseline	Update				
12. Integrated Logistics Support Plan [Required per NPD 7500.1]	OSI-LMD/R		Preliminary	Baseline	Update				
13. Science Data Management Plan [additional information in NPD 2200.1 and NPRs 2200.2, 1441.1, and 8020.12]	SMD/BP			Preliminary			Baseline	Update	
14. Configuration Management Plan [Required per NPR 7120.5; additional information in NPR 7123.1 and SAE/EIA 649]	OCE/R	Preliminary	Baseline	Update					
15. Security Plan [Required per NPR 1040.1 and NPR 1600.1]	OPS/R		Preliminary	Baseline					

16. Technology Transfer (formerly Export) Control Plan [Required per NPR 2190.1]	OIIR/R		Preliminary	Baseline	Update				
17. Communications Plan [additional information in NPR 7120.5]	OComm/BP	Preliminary		Baseline	Update		Update		
18. Knowledge Management Plan [additional information in NPD 7120.4 and NPD 7120.6]	OCE/BP	Preliminary	Baseline	Update	Update				
19. Human Rating Certification Package [Required per NPR 8705.2]	OSMA/R	Initial	Update	Update	Update		Update	Approve Certification	
20. Quality Assurance Surveillance Plan [Required per NPR 8735.2 and NASA FAR Supplement part 1837.604]	OSMA/R	Preliminary	Baseline	Update	Update	Update			
21. Orbital Collision Avoidance Plan [Required per NID 7120.132]	OCE/R			Baseline	Update				
22. Human Systems Integration Plan [additional information in NASA/SP-20210010952 NASA HSI Handbook and NPR 7123.1]	OCE-OSMA-OCHMO/R	Baseline	Update	Update	Update				
1 Review Plan should be baselined before the first review.									

Table I-4 Project Milestone Products Maturity Matrix

Products	Product Owner/ Requirement or Best Practice	Pre-Phase A KDP A	Phase A KDP B		Phase B KDP C	Phase C KDP D		Phase D KDP E		Phase E KDP F	Phase F
		MCR	SRR	SDR/MDR	PDR	CDR	SIR	ORR	MRR/FRR	DR	DRR
Headquarters and Program Products1											
1. FAD [Required per NPR 7120.5]	OCE/R	Baseline									
2. Program Plan [Required per NPR 7120.5]	OCE/R	Baseline									
2.a. Applicable Agency strategic goals [Required per NPR 7123.1]	OCE/R	Baseline	Update	Update							
2.b. Documentation of program-level requirements and constraints on the project (from the Program Plan) and stakeholder expectations, including mission objectives/goals and mission success criteria [Required per NPR 7123.1]	OCE/R	Preliminary	Baseline	Update	Update						
2.c. Documentation of driving mission, technical, and programmatic ground rules and assumptions [Required per NPR 7120.5]	OCE/R	Preliminary	Preliminary	Baseline	Update	Update	Update				
3. Partnerships and interagency and international agreements	OCE/R	Preliminary	Update	Baseline U.S. partnerships and agreements	Baseline international agreements						
4. ASM Decision Memorandum or ASM meeting summary [additional information in NPD 1000.5]	OCE/R		Final								
5. Mishap Preparedness and Contingency Plan [Required per NPR 8621.1]	OSMA/R				Preliminary		Update		Baseline (SMSR)	Update	Update
Project Technical Products2											
1. Concept Documentation [Required per NPR 7123.1]	OCE/R	Approve	Update	Update	Update						

2. Mission, Spacecraft, Ground, and Payload Architectures [Required per NPR 7123.1]	OCE/R	Preliminary mission and spacecraft architecture(s) with key drivers	Baseline mission and spacecraft architecture, preliminary ground and payload architectures. Classify payload(s) by risk per NPR 8705.4.	Update mission and spacecraft architecture, baseline ground and payload architectures	Update mission, spacecraft, ground and payload architectures						
3. Project-Level, System, and Subsystem Requirements [Required per NPR 7123.1]	OCE/R	Preliminary project-level requirements	Baseline project-level and system-level requirements	Update Project-level and system-level requirements, Preliminary subsystem requirements	Update project-level and system-level requirements. Baseline subsystem requirements						
4. Design Documentation [Required per NPR 7123.1]	OCE/R				Preliminary	Baseline	Update		Update		
5. Operations Concept Documentation [Required per NPR 7120.5]	OCE/R	Preliminary	Preliminary	Preliminary	Baseline						
6. Technology Readiness Assessment Documentation [Required per NPR 7120.5 Appendix F FA Template]	OCE/R	Initial	Update	Update	Update	Update					
7. Engineering Development Assessment Documentation [Required per NPR 7120.5 Appendix F FA Template]	OCE/R	Initial	Update	Update	Update						
8. Heritage Assessment Documentation [Required per NPR 7120.5 Appendix F FA Template]	OCE/R	Initial	Update	Update	Update						
9. Systems Safety Analyses (e.g., safety data packages) [Baseline at CDR] [Required per NPR 8715.3]	OSMA/R				Preliminary	Baseline	Update	Up-date	Update		
10. Payload Safety Process Deliverables [Required per NPR 8715.7]	OSMA/R				Preliminary	Preliminary	Baseline				
11. Verification and Validation Report [Required per NPR 7123.1]	OCE/R							Prelim-inary	Baseline		
12. Operations Handbook [additional information in NPR 7120.5 Appendix A]	OCE/R						Preliminary	Baseline	Update	Update	
13. Orbital Debris Assessment [Required per NPR 8715.6]	OSMA/R	Preliminary Assessment			Preliminary design ODAR	Detailed design ODAR			Final ODAR (SMSR)		
14. End of Mission Plans [Required per NPR 8715.6; additional information in NASA-STD-8719.14, App B]	OSMA/R								Baseline (SMSR)	Update per 8715.6	Update
15. Final Mission Report [additional information in NPR 7120.5 Appendix A]	OCE/BP										Final
16. Decommissioning/Disposal Plan [Required per NPR 7123.1]	OCE/R									Baseline	Update Dispos-al portions
17. Industrial Base and Supply Chain Risk Management (SCRM) Strategy and Status [Required per NPR 8735.2]	OSMA/R	Preliminary	Update	Update	Baseline	Update					
18. Criticality Identification Method for Hardware [Required per NPR 8735.2]	OSMA/R	Preliminary	Update	Update	Baseline	Update					
19. Hardware Quality Data Management Analytics [additional information in NPR 8735.2]	OSMA/BP	Preliminary	Update	Update	Baseline	Update	Update	Update	Update		
Project Management, Planning, and Control Products											

1. Formulation Agreement [Required per NPR 7120.5]	OCE/R	Baseline for Phase A; Preliminary for Phase B		Baseline for Phase B							
2. Project Plan [Required per NPR 7120.5]	OCE/R			Preliminary	Baseline						
3. Documentation of performance against Formulation Agreement (see #1 above) or against plans for work to be accomplished during Implementation life-cycle phase, including performance against baselines and status/closure of formal actions from previous KDP [Required by NPR 7120.5]	OCE/R		Summary	Summary	Summary	Summary	Summary	Sum-mary	Summary	Summary	
4.Project Baselines											
4.a. Top technical, cost, schedule and safety risks, risk mitigation plans, and associated resources [Required by NPR 7120.5]	OCE/R	Initial	Update	Update	Update	Update	Update	Update	Update	Update	Update
4.b. Staffing requirements and plans [Required by NPR 7120.5]	OCE/R	Initial	Update	Update	Update	Update		Update			
4.c.i Infrastructure requirements and plans [Required per NPR 9250.1, NPD 8800.14 and NPR 8820.2] Business case analysis for infrastructure [Required per NPR 8800.15.]	OSI-FRED/R	Initial	Update	Update	Update	Update					
4.c.ii Capitalization Determination Form (CDF) (NASA Form 1739) [Required per NPR 9250.1]	OCFO/R	Initial	Update	Update	Update	Update					
4.d. Schedule [Required per NPR 7120.5]	OCFO-SID/R	Risk informed at project level with preliminary Phase D completion ranges	Risk informed at system level with preliminary Phase D completion ranges	Risk informed at subsystem level with preliminary Phase D completion ranges or high and low schedule values with JCL 3. Preliminary Integrated Master Schedule	Risk informed and cost-loaded. Baseline Integrated Master Schedule	Update IMS	Update IMS	Update IMS	Update IMS	Update IMS	Update IMS
4.e. Cost Estimate [Required per NPR 7120.5]	OCFO-SID/R	Preliminary Range estimate	Update	Risk-informed range estimate or high and low-cost values with JCL 3	Risk-informed Baseline	Update	Update	Update	Update	Update	Update
4.f. Basis of Estimate (cost and schedule) [Required per NPR 7120.5]	OCFO-SID/R	Initial (for range)	Update (for range)	Update (for range or high and low values with JCL3)	Update for cost and schedule estimate	Update	Update	Update	Update	Update	Update
4.g. Confidence Level(s) and supporting documentation [Required per NPR 7120.5]	OCFO-SID/R			Preliminary cost confidence level and preliminary schedule confidence level or JCL 3	Baseline Joint Cost and Schedule Confidence Level	Update4	Update5				
4.h. External Cost and Schedule Commitments [Required per NPR 7120.5]	OCFO-SID/R			Preliminary for ranges or high and low values with JCL 3	Baseline						
4.i. CADRe [Required per NPR 7120.5]	OCFO-SID/R		Baseline	Update	Update	Update	Update		Update6	Update	
4.j PMB [Required per NPR 7120.5]	OCFO-SID/R				Baseline	Update	Update	Update	Update		

1 These products are developed by the Mission Directorate.
2 These document the work of the key technical activities performed in the associated phases.
3 Projects with LCC or initial capability cost of $1B or over develop high and low values for cost and schedule with the corresponding JCL values at KDP B per Section 2.4.3.1.a.
4 Projects with LCC or initial capability cost of $1B or over update the JCL at CDR per Section 2.4.3.3.
5 Projects with LCC or initial capability cost of $1B or over update the JCL at KDP D per Section 2.4.3.4 if current development costs exceed development ABC cost by 5 percent or more.
6 The CADRe for MRR/FRR is considered the "Launch CADRe" to be completed after the launch.

Table I-5 Project Plan Control Plans Maturity Matrix

(See Appendix H Template for Control Plan Details.)	Product Owner/Requirement or Best Practice	Pre-Phase A	Phase A KDP B		Phase B KDP C		Phase C KDP D	Phase D KDP E		Phase E KDP F
		MCR	SRR	SDR/MDR	PDR	CDR	SIR	ORR	MRR/ FRR	DR
1. Technical, Schedule, and Cost Control Plan [Required per NPR 7120.5]	OCE/R	Approach for managing schedule and cost during Phase A1	Preliminary	Baseline	Update					
2. Safety and Mission Assurance Plan [Required per NPRs 8705.2 and 8705.4]	OSMA/R		Baseline	Update	Update	Update			Update (SMSR)	Update
3. Risk Management Plan [Required per NPR 8000.4]	OSMA/R	Approach for managing risks during Phase A 1	Baseline	Update	Update					
4. Acquisition Strategy [Required per NPD 1000.5]	OCE/R	Preliminary Strategy	Baseline	Update	Update					
5. Technology Development Plan (may be part of Formulation Agreement) [additional information in NPR 7500.2, NPR 7123.1, and NPR 7120.5]	OCE/BP	Baseline	Update	Update	Update					
6. Systems Engineering Management Plan [Required per NPR 7123.1]	OCE/R	Preliminary	Baseline	Update	Update					
7. System Security Plan [Required per NPR 2810.1]	OCIO/R		Preliminary		Update	Baseline	Update	Update		
8. Software Management Plan(s) [Required per NPR 7150.2; additional information in NASA-STD-8739.8]	OCE/R		Preliminary	Baseline	Update					
9. Verification and Validation Plan [Required per NPR 7120.5, additional information in NPR 7123.1]	OCE/R	Preliminary Approach2		Preliminary	Baseline	Update	Update			
10. Review Plan [Required per NPR 7120.5]3	OCE/R	Preliminary	Baseline	Update	Update					
11. Mission Operations Plan [Required per NPR 7120.5]	OCE/R						Preliminary	Baseline	Update	
12. NEPA Compliance Documentation [Required per NPR 8580.1]	OSI-EMD/R			Baseline						
13. Integrated Logistics Support Plan [Required per NPD 7500.1]	OSI-LMD/R	Approach for managing logistics 2	Preliminary	Preliminary	Baseline	Update				
14. Science Data Management Plan [additional information in NPD 2200.1 and NPRs 2200.2, 1441.1, and 8020.12]	SMD/BP				Preliminary			Baseline	Update	
15. Integration Plan [Required per NPR 7120.5]	OCE/R	Preliminary approach2		Preliminary	Baseline	Update				

16. Configuration Management Plan [Required per NPR 7120.5; additional information in NPR 7123.1 and SAE/EIA 649]	OCE/R		Baseline	Update	Update					
17. Security Plan [Required per NPR 1040.1 and NPR 1600.1]	OPS/R			Preliminary	Baseline					Update annually
18. Project Protection Plan [Required per NPR 1058.1, additional information in NASA-STD-1006]	OCE/R			Preliminary	Baseline	Update	Update	Update	Update	Update annually
19. Technology Transfer (formerly Export) Control Plan [Required per NPR 2190.1]	OIIR/R			Preliminary	Baseline	Update				
20. Knowledge Management Plan [additional information in NPD 7120.4 and NPD 7120.6]	OCE/BP	Approach for managing during Phase A 1		Preliminary	Baseline	Update				
21. Human Rating Certification Package [Required per NPR 8705.2]	OSMA/R	Preliminary approach2	Initial	Update	Update	Update		Update	Approve Certification	
22. Planetary Protection Plan [Required per NPD 8020.7 and NPR 8020.12]	OSMA/R			Planetary Protection Categorization (if applicable)	Baseline					
23. Nuclear Launch Authorization Plan [additional information in NPR 8715.3]	OSMA/R			Baseline (mission has nuclear materials)						
24. Range Safety Risk Management Process Documentation [Required per NPR 8715.5]	OSMA/R				Preliminary	Preliminary	Baseline			
25. Communications Plan [additional information in NPR 7120.5]	OComm/BP		Preliminary		Baseline	Update		Update		
26. Quality Assurance Surveillance Plan [Required per NPR 8735.2 and NASA FAR Supplement part 1837.604]	OSMA/R		Preliminary	Baseline	Update	Update	Update			
27. Orbital Collision Avoidance Plan [Required per NID 7120.132]	OCE/R				Baseline	Update				
28. Human Systems Integration Plan [additional information in NASA/SP-20210010952 NASA HSI Handbook and NPR 7123.1]	OCE-OSMA-OCHMO/R	Preliminary	Baseline	Update	Update	Update				

1 Not the Plan, but documentation of high-level process. May be documented in MCR briefing package.
2 Not the Plan, but documentation of considerations that might impact the cost and schedule baselines. May be documented in MCR briefing package.
3 Review Plan should be baselined before the first review.

Table I-6 Single-Project Program Milestone Products Maturity Matrix

Products	Product Owner/Require-ment or Best Practice	Pre-Phase A KDP A	Phase A KDP B		Phase B KDP C	Phase C KDP D		Phase D KDP E		Phase E KDP F	Phase F
		MCR	SRR	SDR/MDR	PDR	CDR	SIR	ORR	MRR/FRR	DR	DRR
Headquarters Products[1]											
1. FAD [Required per NPR 7120.5]	OCE/R	Baseline									
2. PCA [Required per NPR 7120.5]	OCE/R			Preliminary	Baseline						

3. Traceability of Agency strategic goals and Mission Directorate requirements and constraints to program/project-level requirements and constraints. [Required per NPR 7123.1]	OCE/R	Preliminary	Baseline	Update	Update						
4. Documentation of driving mission, technical, and programmatic ground rules and assumptions [Required per NPR 7120.5]	OCE/R	Preliminary	Preliminary	Baseline	Update	Update	Update				
5. Partnerships and inter-agency and international agreements	OCE/R	Preliminary	Update	Baseline U.S. partnerships and agreements	Baseline international agreements						
6. ASM Decision Memorandum or ASM meeting summary [additional information in NPD 1000.5]	OCE/R		Final								
7. Mishap Preparedness and Contingency Plan [Required per NPR 8621.1]	OSMA/R				Preliminary		Update		Baseline (SMSR)	Update	Update
Single-Project Program Technical Products[2]											
1. Concept Documentation [Required per NPR 7123.1]	OCE/R	Approve	Update	Update	Update						
2. Mission, Spacecraft, Ground, and Payload Architectures [Required per NPR 7123.1]	OCE/R	Preliminary mission and spacecraft architecture(s) with key drivers	Baseline mission and spacecraft architecture, preliminary ground and payload architectures. Classify payload(s) by risk per NPR 8705.4.	Update mission and spacecraft architecture, baseline ground and payload architectures	Update mission, spacecraft, ground, and payload architectures						
3. Project-Level, System, and Subsystem Requirements [Required per NPR 7123.1]	OCE/R	Preliminary project-level requirements	Baseline project-level and system-level requirements	Update Project-level and system-level requirements, Preliminary subsystem requirements	Update project-level and system-level requirements. Baseline subsystem requirements						
4. Design Documentation [Required per NPR 7123.1]	OCE/R				Preliminary	Baseline	Update		Update		
5. Operations Concept Documentation [Required per NPR 7120.5]	OCE/R	Preliminary	Preliminary	Preliminary	Baseline						
6. Technology Readiness Assessment Documentation [Required per NPR 7120.5 Appendix F FA Template]	OCE/R	Initial	Update	Update	Update	Update					
7. Engineering Development Assessment Documentation [Required per NPR 7120.5 Appendix F FA Template]	OCE/R	Initial	Update	Update	Update						
8. Heritage Assessment Documentation [Required per NPR 7120.5 Appendix F FA Template]	OCE/R	Initial	Update	Update	Update						
9. Systems Safety Analyses (e.g., safety data packages) [Baseline at CDR] [Required per NPR 8715.3]	OSMA/R				Preliminary	Baseline	Update	Up-date	Update		
10. Payload Safety Process Deliverables [Required per NPR 8715.7]	OSMA/R				Preliminary	Preliminary	Baseline				
11. Verification and Validation Report [Required per NPR 7123.1]	OCE/R							Prelim-inary	Baseline		
12. Operations Handbook [additional information in NPR 7120.5 Appendix A]	OCE/R						Preliminary	Base-line	Update	Update	

13. Orbital Debris Assessment [Required per NPR 8715.6]	OSMA/R	Preliminary Assessment			Preliminary design ODAR	Detailed design ODAR			Final ODAR (SMSR)		
14. End of Mission Plans [Required per NPR 8715.6; additional information in NASA-STD-8719.14, App B]	OSMA/R								Baseline (SMSR)	Update per 8715.6	Update
15. Final Mission Report [additional information in NPR 7120.5 Appendix A]	OCE/BP										Final
16. Decommissioning/Disposal Plan [Required per NPR 7123.1]	OCE/R									Baseline	Update disposal portions
17. Industrial Base and Supply Chain Risk Management (SCRM) Strategy and Status [Required per NPR 8735.2]	OSMA/R	Preliminary	Update	Update	Baseline	Update					
18. Criticality Identification Method for Hardware [Required per NPR 8735.2]	OSMA/R	Preliminary	Update	Update	Baseline	Update					
19. Hardware Quality Data Management Analytics [additional information in NPR 8735.2]	OSMA/BP	Preliminary	Update	Update	Baseline	Update	Update	Update	Update		
Single-Project Program Management, Planning, and Control Products											
1. Formulation Agreement [Required per NPR 7120.5]	OCE/R	Baseline for Phase A; Preliminary for Phase B		Baseline for Phase B							
2. Program Plan [Required per NPR 7120.5] 3	OCE/R			Preliminary	Baseline						
3. Project Plan [Required per NPR 7120.5] 3	OCE/R			Preliminary	Baseline						
4. Documentation of performance against Formulation Agreement (see #1 above) or against plans for work to be accomplished during Implementation life-cycle phase, including performance against baselines and status/closure of formal actions from previous KDP [Required per NPR 7120.5]	OCE/R		Summary	Summary	Summary	Summary	Summary	Sum-mary	Summary	Summary	
5.Project Baselines											
5.a. Top technical, cost, schedule and safety risks, risk mitigation plans, and associated resources [Required per NPR 7120.5]	OCE/R	Initial	Update	Update	Update	Update	Update	Update	Update	Update	Update
5.b. Staffing requirements and plans [Required by NPR 7120.5]	OCE/R	Initial	Update	Update	Update	Update		Update			
5.c.i. Infrastructure requirements and plans [Required per NPR 9250.1, NPD 8800.14, and NPR 8820.2] Business case analysis for infrastructure [Required per NPR 8800.15.]	OSI-FRED/R	Initial	Update	Update	Update	Update					
5.c.ii Capitalization Determination Form (CDF) (NASA Form 1739) [Required per NPR 9250.1]	OCFO/R	Initial	Update	Update	Update	Update					
5.d. Schedule [Required per NPR 7120.5]	OCFO-SID/R	Risk informed at project level with preliminary Phase D completion ranges	Risk informed at system level with preliminary Phase D completion ranges	Risk informed at subsystem level with preliminary Phase D completion ranges or high and low schedule values with JCL. 4	Risk informed and cost-loaded. Baseline Integrated Master Schedule	Update IMS	Update IMS	Update IMS	Update IMS	Update IMS	Update IMS

				Prelim-inary IMS							
5.e. Cost Estimate [Required per NPR 7120.5]	OCFO-SID/R	Preliminary Range estimate	Update	Risk-informed range estimate or high and low-cost values with JCL 4	Risk-informed baseline	Update	Update	Update	Update	Update	Update
5.f. Basis of Estimate (cost and schedule) [Required per NPR 7120.5]	OCFO-SID/R	Initial (for range)	Update (for range)	Update (for range or high and low values with JCL4)	Update for cost and schedule estimate	Update	Update	Update	Update	Update	Update
5.g. Confidence Level(s) and supporting documentation [Required per NPR 7120.5]	OCFO-SID/R			Preliminary cost confidence level and preliminary schedule confidence level or JCL 4	Baseline Joint Cost and Schedule Confidence Level	Update5	Update6				
5.h. External Cost and Schedule Commitments [Required per NPR 7120.5]	OCFO-SID/R			Preliminary for ranges or JCL 4	Baseline						
5.i. CADRe [Required per NPR 7120.5]	OCFO-SID/R		Baseline	Update	Update	Update	Update		Update7	Update	
5.j. PMB [Required per NPR 7120.5]	OCFO-SID/R				Baseline	Update	Update	Update	Update		

1 These products are developed by the Mission Directorate.
2 These document the work of the key technical activities performed in the associated phases.
3 The Program Plan and Project Plans may be combined with the approval of the MDAA.
4 Single-project programs with LCC or initial capability cost of $1B or over develop high and low values for cost and schedule with corresponding JCL values at KDP B per Section 2.4.3.1.a.
5 Single-project programs with LCC or initial capability cost of $1B or over update the JCL at CDR per Section 2.4.3.3.
6 Projects with LCC or initial capability cost of $1B or over update the JCL at KDP D per Section 2.4.3.4 if current development costs exceed development ABC cost by 5 percent or more.
7 The CADRe for MRR/FRR is considered the “Launch CADRe” to be completed after the launch.

Table I-7 Single-Project Program Plan Control Plans Maturity Matrix

(See Templates in Appendices G and H for Control Plan Details)	Product Owner/Requirement or Best Practice	Pre-Phase A	Phase A KDP B		Phase B KDP C	Phase C KDP D		Phase D KDP E		Phase E KDP F
		MCR	SRR	SDR/MDR	PDR	CDR	SIR	ORR	MRR/ FRR	DR
1. Technical, Schedule, and Cost Control Plan [Required per NPR 7120.5]	OCE/R	Approach for managing schedule and cost during Phase A 1	Preliminary	Baseline	Update					
2. Safety and Mission Assurance Plan [Required per NPRs 8705.2 and 8705.4]	OSMA/R		Baseline	Update	Update	Update			Update (SMSR)	Update
3. Risk Management Plan [Required per NPR 8000.4]	OSMA/R	Approach for managing risks during Phase A 1	Baseline	Update	Update					
4. Acquisition Strategy [Required per NPD 1000.5]	OCE/R	Preliminary Strategy	Baseline	Update	Update					
5. Technology Development Plan (may be part of Formulation Agreement) [additional information in NPR 7500.2, NPR 7123.1, and NPR 7120.5]	OCE/BP	Baseline	Update	Update	Update					
6. Systems Engineering Management Plan [Required per NPR 7123.1]	OCE/R	Preliminary	Baseline	Update	Update					
7. System Security Plan [Required per NPR 2810.1]	OCIO/R		Preliminary		Update	Baseline	Update	Update		
8. Software Management Plan(s) [Required per NPR 7150.2; additional information in NASA-STD-8739.8]	OCE/R		Preliminary	Baseline	Update					

9. Verification and Validation Plan [Required per NPR 7120.5, additional information in NPR 7123.1]	OCE/R	Preliminary Approach2		Preliminary	Baseline	Update	Update			
10. Review Plan [Required per NPR 7120.5]3	OCE/R	Preliminary	Baseline	Update	Update					
11. Mission Operations Plan [Required per NPR 7120.5]	OCE/R						Preliminary	Baseline	Update	
12. NEPA Compliance Documentation [Required per NPR 8580.1]	OSI-EMD/R			Baseline						
13. Integrated Logistics Support Plan [Required per NPD 7500.1]	OSI-LMD/R	Approach for managing logistics 2	Preliminary	Preliminary	Baseline	Update				
14. Science Data Management Plan [additional information in NPD 2200.1 and NPRs 2200.2, 1441.1, and 8020.12]	SMD/BP				Preliminary			Baseline	Update	
15. Integration Plan [Required per NPR 7120.5]	OCE/R	Preliminary approach2		Preliminary	Baseline	Update				
16. Configuration Management Plan [Required per NPR 7120.5; additional information in NPR 7123.1 and SAE/EIA 649]	OCE/R		Baseline	Update	Update					
17. Security Plan [Required per NPR 1040.1 and NPR 1600.1]	OPS/R			Preliminary	Baseline					Update annually
18. Project Protection Plan [Required per NPR 1058.1, additional information in NASA-STD-1006]	OCE/R			Preliminary	Baseline	Update	Update	Update	Update	Update annually
19. Technology Transfer (formerly Export) Control Plan [Required per NPR 2190.1]	OIIR/R			Preliminary	Baseline	Update				
20. Knowledge Management Plan [additional information in NPD 7120.4 and NPD 7120.6]	OCE/BP	Approach for managing during Phase A 1		Preliminary	Baseline	Update				
21. Human Rating Certification Package [Required per NPR 8705.2]	OSMA/R	Preliminary approach2	Initial	Update	Update	Update		Update	Approve Certification	
22. Planetary Protection Plan [Required per NPD 8020.7 and NPR 8020.12]	OSMA/R			Planetary Protection Categorization (if applicable)	Baseline					
23. Nuclear Launch Authorization Plan [additional information in NPR 8715.3]	OSMA/R			Baseline (mission has nuclear materials)						
24. Range Safety Risk Management Process Documentation [Required per NPR 8715.5]	OSMA/R				Preliminary	Preliminary	Baseline			
25. Communications Plan [additional information in NPR 7120.5]	OComm/BP		Preliminary		Baseline	Update		Update		
26. Quality Assurance Surveillance Plan [Required per NPR 8735.2 and NASA FAR Supplement part 1837.604]	OSMA/R		Preliminary	Baseline	Update	Update	Update			

27. Orbital Collision Avoidance Plan [Required per NID 7120.132]	OCE/R				Baseline	Update				
28. Human Systems Integration Plan [additional information in NASA/SP-20210010952 NASA HSI Handbook and NPR 7123.1]	OCE-OSMA-OCHMO/R	Preliminary	Baseline	Update	Update	Update				

1 Not the Plan, but documentation of high-level process. May be documented in MCR briefing package.
2 Not the Plan, but documentation of considerations that might impact the cost and schedule baselines. May be documented in MCR briefing package.
3 Review Plan should be baselined before the first review.

Appendix J. References

a. Declaration of Policy, 15 U.S.C. §205b, reference: Metric Conversion Act, Pub. L. No. 94-168, December 23, 1975, as amended by the Omnibus Trade and Competitiveness Act of 1988, Pub. L. No. 100-418.

b. Metric Usage in Federal Government Programs, Exec. Order No. 12770, dated July 25, 1991.

c. Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities, OMB Circular No. A-119.

d. NPD 1200.1, NASA Internal Control.

e. NPD 1210.2, NASA Surveys, Audits, and Reviews Policy.

f. NPD 1440.6, NASA Records Management.

g. NPD 1600.2, NASA Security Policy.

h. NPD 2200.1, Management of NASA Scientific and Technical Information.

i. NPD 2800.1, Managing Information Technology.

j. NPD 7120.6, Knowledge Policy for Programs and Projects.

k. NPD 8010.3, Notification of Intent to Decommission or Terminate Operating Space Systems and Terminate Missions.

l. NPD 8600.1, Capability Portfolio Management.

m. NPD 8700.1, NASA Policy for Safety and Mission Success.

n. NPD 8720.1, NASA Reliability and Maintainability (R&M) Program Policy.

o. NPD 8730.5, NASA Quality Assurance Program Policy.

p. NPD 8900.5, NASA Health and Medical Policy for Human Space Exploration.

q. NPR 1441.1, NASA Records Management Program Requirements.

r. NPR 2200.2, Requirements for Documentation, Approval and Dissemination of Scientific and Technical Information.

s. NPR 7120.7, NASA Information Technology Program and Project Management Requirements.

t. NPR 7120.8, NASA Research and Technology Program and Project Management Requirements.

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