# NASA Procedural Requirements

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**NPR 7120.7**

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## NASA Information Technology and Institutional Infrastructure Program and Project Management Requirements

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**Responsible Office: Office of the Chief Engineer**

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## PREFACE

### P.1 PURPOSE

This document establishes the requirements by which NASA will formulate and execute information technology and institutional infrastructure programs and projects, consistent with the governance model contained in the NASA Governance and Strategic Management Handbook (NPD 1000.0).

### P.2 APPLICABILITY

a. This NASA Interim Directive (NID) to NPR 7120.7 is applicable to NASA Headquarters and NASA Centers, including Component Facilities and Technical and Service Support Centers. This language applies to Jet Propulsion Laboratory (JPL), other contractors, grant recipients, or parties to agreements only to the extent specified or referenced in the appropriate contracts, grants or agreements.

b. This NASA Interim Directive (NID) to NPR 7120.7 is applicable to all NASA information technology and institutional infrastructure programs and projects to include the development of information technology capabilities, real property (construction of facilities and environmental compliance and restoration), and other mission support investments, as described in section 1.1.2. For existing programs and projects, the requirements of this NID to NPR 7120.7 are applicable to the program/project's current phase and to the phases yet to be completed as determined by the cognizant Decision Authority.

### P.3 AUTHORITY

a. 51 U.S.C. § 20113(a) of the National Aeronautics and Space Act.

b. NPD 7120.4, Program/Project Management.

### P.4 APPLICABLE DOCUMENTS

a. NID-9250, Identifying Capital Assets and Capturing Their Cost.

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

c. NPD 1000.3, The NASA Organization.

d. NPD 1382.17, NASA Privacy Policy.

e. NPD 1440.6, NASA Records Management.

f. NPD 2800.1, Managing Information Technology.

g. NPD 2820.1, NASA Software Policy.

h. NPD 7120.4, Program/Project Management.

i. NPD 8820.2, Design and Construction of Facilities.

j. NPR 1441.1, NASA Records Retention Schedules.

k. NPR 2800.1, Managing Information Technology.

l. NPR 2810.1, Security of Information Technology.

m. NPR 2830.1, NASA Enterprise Architecture Procedures.

n. NPR 4300.1, NASA Personal Property Disposal Procedural Requirements.

o. NPR 7150.2, NASA Software Engineering Requirements.

p. NPR 8000.4, Risk Management Procedural Requirements.

q. NPR 8590.1, NASA Environmental Compliance and Restoration (ECR) Program.

r. NPR 8820.2, Facility Project Implementation Guide.

s. NPR 9250.1 Property, Plant, and Equipment and Operating Materials and Supplies

t. M-10-27, Information Technology Investment Baseline Management Policy.

## P.5 MEASUREMENT/VERIFICATION

Compliance with this document is verified by submission to cognizant NASA officials, at key decision points, of the gate products identified in this document.

## P.6 CANCELLATION

NPR 7120.7 NASA Information Technology and Institutional Infrastructure Program and Project Management Requirements, dated November 3, 2008, is cancelled.

/S/ Original signed by Harold Bell for
**Michael G. Ryschkewitsch**
**Chief Engineer**

# CHAPTER 1. Introduction

## 1.1 Key Policy Changes in this NID to NPR 7120.7

1.1.1 This NID to NPR 7120.7 has been modified to include, for Information Technology programs and projects, a standardized Work Breakdown Structure (WBS) rebaselining requirements, and updates to the Glossary.

1.1.2 For existing programs and projects, the requirements of this NPR are applicable to the program/project's current phase and to phases yet to be completed as determined by the responsible Program Manager or Center CIO and concurred with by the Decision Authority.

## 1.2 Background

1.2.1 NASA distinguishes programs and projects in three investment areas or product lines: Research and Technology, Space Flight, and Information Technology (IT) and institutional infrastructure. This document establishes the management requirements for formulating, approving, implementing, and evaluating NASA IT and institutional infrastructure programs and projects consistent with the governance model contained in NPD 1000.0, NASA Governance and Strategic Management Handbook.

1.2.2 This NPR identifies four types of IT and institutional infrastructure investments:

a. IT - Any equipment or interconnected system(s) or subsystem(s) of equipment that is used in the automatic acquisition, storage, analysis, evaluation, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by the Agency.

(1) NASA distinguishes between highly specialized IT and IT that is not highly specialized. Highly specialized IT is defined in Appendix A, Definitions, and is subject to NPR 7120.5, NASA Space Flight Program and Project Management Requirements, or to NPR 7120.8, NASA Research and Technology Program and Project Management Requirements, depending on the program or project content.

(2) IT programs and projects that are not highly specialized IT are subject to the requirements of this document, unless granted a waiver by the NASA Chief Information Officer (CIO) or the CIO of the Center making the investment, if they meet either of the following criteria:

(a) If the program or project includes the development of new IT systems or capabilities: $500K or greater total development and implementation cost or affects more than one Center.

(b) If the program or project includes modification to or enhancement of existing IT systems or capabilities: $500K or greater total modification/enhancement cost, regardless of how many Centers are affected.

(3) The development, modification, and enhancement (DME) of Web-based applications (here meaning software applications that support an Internet browser as a user interface) as a class are subject to this document if they meet one of the above criteria. The development, modification, and enhancement of Web sites and Web-based questionnaires that are used solely to disseminate or collect information are not subject to this document.

(4) For IT that is not highly specialized, the NASA CIO or the CIO of the implementing Center may require a program or project to comply with the requirements of this document even if the program or project does not meet the above criteria. Such a decision may be made, for example, for reasons related to high risk, high importance, or high visibility of the program or project. In making this determination, the CIO will consult and coordinate with the office that is sponsoring the program or project. In the event of a disagreement, the sponsoring office may appeal the CIO's or delegee's determination. If not resolved at a lower level, the NASA Associate Administrator will make the final determination. The right of appeal shall not be construed as a right to delay or avoid the CIO's authority, i.e., appeals must be pursued expeditiously and responsive interim plans put in place pending hearing of the appeal.

(5) It is possible that programs and projects governed by NPR 7120.5, or NPR 7120.8, will have systems under development with both highly specialized and not highly specialized IT components, which must be developed and integrated under a unified management structure to ensure technical and programmatic success. Such IT components embedded in programs and projects will also comply with policies and other technical requirements to ensure systems and capabilities being developed align with Agency requirements and direction for IT architectures, policies, procedures, standards, guidelines, and practices. The Office of the CIO will work with the Mission Directorate or Mission Support Office responsible for the program or project to identify such embedded IT components and define boundaries and interfaces for inclusion in IT management processes. The Office of the CIO will also coordinate with the appropriate Governing Body required by NPR 7120.5, or NPR 7120.8, as described in section 2.3 of this document to reflect those interactions.

(6) The Mission Directorate or Mission Support Office responsible for a program or project and the Office of the CIO will come to agreement concerning whether particular instances of IT included in the program or project are highly specialized or not highly specialized. The agreements shall be documented in the program plan or project plan (or other appropriate document) encompassing the systems of concern. In the event that disagreements cannot be resolved at a lower level, the NASA Associate Administrator will make the final determination.

b. Construction of Facilities (CoF) - Construction and renovation of facilities on NASA-controlled real property. This investment includes facility planning, budgeting, design, construction, and activation.

(1) Critical technical facilities specifically developed or significantly modified for space flight systems are subject to NPR 7120.5, and not this document.

c. Environmental Compliance and Restoration (ECR) - Environmental restoration and environmental management efforts.

d. Other Mission Support Investments (OMSI) - Investments for developing or enhancing a supporting capability for the Agency or a Center that are not covered elsewhere in this document or under other NPR 7120 guidance. These investments are considered to be important and visible enough to warrant project management reporting and oversight. Examples include Agency-wide implementation of a Presidential directive (e.g., HSPD-12) or certification program (e.g., Voluntary Protection Program); establishment of a centralized capability for mission support services (e.g., transfer of new responsibilities to the NASA Shared Services Center); or implementation of a security and program protection project at a Center (e.g., a new emergency preparedness program).

(1) OMSI programs and projects are subject to the requirements of this document if they meet either of the following criteria:

(a) The total development and implementation cost of the program or project is $1M or greater.

(b) The total development and implementation of the program or project will take one year or longer.

(2) The Official-in-Charge of the implementing Mission Directorate or Mission Support Office or the Center Director of an implementing Center may require a program or project to comply with the requirements of this document even if the program or project does not meet the above criteria. Such a decision may be made, for example, for reasons related to high risk, high importance, or high visibility of the program or project.

**1.3 Overview of Management Process**

1.3.1 Management of NASA programs and projects is a four-part process consisting of:

a. Formulation - the assessment of feasibility, technology and concepts, risk assessment, teambuilding, development of operations concepts, alternatives evaluation and trade studies, 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 identification of how the program or project supports the Agency's strategic needs, goals, objectives, and/or NASA Education outcomes.

b. Approval - the acknowledgement by the responsible official (the Decision Authority) that the program/project has met expectations and formulation requirements and is ready to proceed to implementation.

c. Implementation - the execution of approved plans for the development, construction, testing, and operation of products and services, and the use of control systems to ensure performance to approved plans and alignment with the NASA Strategic Plan.

d. Evaluation - the continual, independent (i.e., outside the advocacy chain of the program or project) evaluation of the performance of a program or project and incorporation of the evaluation findings to ensure adequacy of planning and execution according to approved plans.

1.3.2 NASA's IT and institutional infrastructure program and project management process is based on life cycles with key decision points at life-cycle phase boundaries, evolving products, a decision authority, a governance structure, and independent assessment.

1.3.3 The scope and scale of NASA IT and institutional infrastructure programs and projects are varied. They include environmental cleanup projects at an individual Center; Agency-wide programs such as the Integrated Enterprise Management Program, which includes a dozen or more financial, procurement, asset management, and human capital projects; and educational projects such as the NASA Explorer Schools, which may be in evaluation for ten years or more. The requirements and management process of IT and institutional infrastructure programs and projects take into account the scope and scale of the program or project.

**1.4 Document Structure**

1.4.1 The remainder of this document is organized as follows: Chapter 2 defines the life cycles for IT and institutional infrastructure programs and projects, and Chapter 3 defines the roles and responsibilities of program and project management.

1.4.2 Chapter 4 defines the requirements for IT projects.

1.4.3 The requirements for CoF projects are defined in NPD 8820.2, Design and Construction of Facilities, and NPR 8820.2, Facility Project Implementation Guide.

1.4.4 The requirements for ECR projects are defined in NPR 8590.1, NASA Environmental Compliance and Restoration (ECR) Program.

1.4.5 Chapter 5 defines the requirements for OMSI projects.

1.4.6 Chapter 6 has required gate products at Key Decision Points (KDPs) as referenced in Chapters 4 and 5 and defines the waiver process for the requirements in this document.

1.4.7 Appendices A and B contain definitions and acronyms.

1.4.8 Appendices C through F contain templates for key program and project management documents.

1.4.9 Appendix G contains entrance and success criteria for IT project reviews.

1.4.10 Appendix H contains standard work breakdown structure for IT projects.

1.4.11 In this document, a requirement is identified by “shall,” a good practice by “should,” permission by “may” or “can,” expectation by “will,” and descriptive material by “is.”

## CHAPTER 2. NASA Life Cycles for Information Technology and Institutional Infrastructure Programs and Projects

### 2.1 Defining Programs and Projects

2.1.1 To support its diverse activities, NASA invests in a complex set of supporting IT and institution and infrastructure development and enhancement programs and projects. Programs and projects are different and the following definitions are used to distinguish between the two:

a. Program - a strategic investment by a Mission Directorate or Mission Support Office that has a defined architecture and/or technical approach, requirements, funding level, and a management structure that initiates and directs one or more projects. A program defines a strategic direction that the Agency has identified as needed to implement Agency goals and objectives.

b. Project - a specific investment 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 needs.

c. Activity - an operation that sustains NASA as an organization. Unlike projects, which are temporary and unique, activities are ongoing and repetitive.

d. The term "Mission Support Office," as used in this document, refers to any Headquarters non-Mission Directorate office that initiates a program or project. Refer to the definition of "Mission Support Office" in Appendix A for additional information.

2.1.2 For CoF projects, the facilities program is as described in NPR 8820.2 and should be referenced for detailed requirements for CoF program/project management.

2.1.3 For ECR projects, the environmental program is as described in NPR 8590.1 and should be referenced for detailed requirements for ECR program/project management.

2.1.4 The Office of the Chief Financial Officer maintains the official database of the structure of NASA's work, which is named the Metadata Manager (MdM). This database documents the Agency's financial Work Breakdown Structure (WBS). At the highest level, a WBS element is flagged as an activity or a project. An activity is an ongoing operation to sustain NASA as an organization. IT and institutional infrastructure elements identified as projects comply with this NPR. The Office of Chief Engineer (OCE) approves the designation of an element as a project or an activity. Project managers are responsible for maintaining project attributes in MdM.

2.1.5 NASA strives to execute all programs and projects with excellence. Management requirements and oversight should track with the investment's magnitude and Agency priority. These factors are taken into account in IT and institutional infrastructure program and project requirements; the assignment of a program and project Governing Body; and identification of the Decision Authority for the program or project. A waiver process is established in section 6.2 to adapt the requirements to the scope and scale of a project. The program plan and the project plan are also used to define program and project requirements. A program plan template is found in Appendix E. A project plan template is found in Appendix F.

## 2.2 Program/Project Oversight and Decision Authority

2.2.1 The NASA strategic management framework has a governance structure, which consists of three Agency-level management councils: the Strategic Management Council (SMC), the Program Management Council (PMC), and the Operations Management Council (OMC). The SMC is chaired by the Administrator and determines NASA's strategic direction and assesses Agency strategic progress. The PMC is chaired by the Associate Administrator and assesses program and project performance. Mission Directorate PMCs (DPMCs) support the Agency PMC. The OMC is chaired by the Deputy Administrator and reviews and approves institutional plans. In most cases, the OMC is the Governing Body for IT and institutional infrastructure programs and projects; however, in exceptional cases the PMC or the SMC may be assigned as the Governing Body. The OMC may also delegate governance to a Mission Support Office. If the Mission Support Office does not have an appropriate established oversight body, one will be formed. In other cases, another institutional committee, such as the Education Coordinating Committee, may be assigned as the Governing Body. If a Mission Directorate has an IT and institutional infrastructure program or project, the DPMC may be assigned as the Governing Body.

2.2.2 The Governing Body is the council, committee, board, or other organization with the responsibility of periodically evaluating the cost, schedule, risk, and performance of a program or project within its purview. The evaluation focuses on whether the program or project is meeting its commitments to the Agency. The Governing Body conducts a review prior to each KDP and then makes recommendations to the Decision Authority based on its findings.

2.2.3 A KDP is a point in time where the Decision Authority makes a decision on the readiness of a program or project to progress to the next phase of the life cycle. KDPs serve at each phase as gates through which programs and projects must pass. Within each phase, the KDP is preceded by one or more reviews, including a Governing Body review. Program KDPs are designated with roman numerals, e.g., KDP II, and project KDPs are designated with letters, e.g., KDP B.

2.2.4 The Decision Authority is the individual responsible for authorizing the transition at a KDP to the next life-cycle phase for a program or project. For programs and projects

governed by the OMC, the Decision Authority is the NASA Deputy Administrator. This authority can be delegated to the Mission Support Office Official-in-Charge, usually an Assistant Administrator. The Decision Authority may also be the chairperson of the Governing Body.

**2.3 IT Governance**

2.3.1 The Office of the CIO has implemented a governance model that pertains to investments in IT that are not highly specialized, as highly specialized IT is defined in Appendix A. The governance model includes an IT Strategy and Investment Board

(IT SIB), an IT Program Management Board (IT PMB), and an IT Management Board (ITMB).

2.3.2 The purpose of the IT SIB is to provide a forum for senior-level stakeholder participation in the setting of IT strategy and policy of broad impact in terms of budget or operational capacity, as well as prioritization of significant IT investments that align with the strategy and mission of the Agency. The purpose of the IT PMB is to provide a forum for high-level Agency participation in the oversight and evaluation of Agency IT programs and projects. The purpose of the ITMB is to make decisions regarding performance, integration, and other issues pertaining to operational systems. The ITMB also serves as a senior-level Configuration Control Board (CCB) for Agency infrastructure projects, reviewing and approving high-level infrastructure requirements.

2.3.3 The IT PMB is the Governing Body for IT programs and projects that are in the scope of this document. The IT PMB has two levels: an Agency IT PMB level and a Center IT PMB level. Center IT PMBs are Governing Bodies performing the comparable functions of the Agency IT PMB, but at the Center level. Centers may assign Center IT PMB responsibilities to a new or existing body, e.g., the Center Management Council. Table 2-1 describes which IT PMB oversees a particular program or project.

| **Criteria** | **Programs*** | **Projects with DME cost $1M or more (full cost basis)** | **Projects with DME cost less than $1M (full cost basis)** | **Projects with high visibility as determined by NASA CIO** | **Projects with high impact as determined by NASA CIO** | **Projects with high risk as determined by NASA CIO** |
|---|---|---|---|---|---|---|
| Agency IT PMB | X | X | | X | X | X |
| Center IT PMB | | | X | | | |

*For programs delegated to the IT PMB by the Agency OMC or PMC; DME: Development, Modification, or Enhancement.

Table 2-1: Scope of Agency IT PMB vs. Center IT PMB

2.3.4 The NASA CIO is the Decision Authority for programs and projects overseen by the Agency IT PMB. The Center CIO is the Decision Authority for programs and projects overseen by the Center IT PMBs.

2.3.5 The NASA CIO will have visibility into projects in the scope of this document and, regardless of the criteria in the table above, may designate oversight of a particular project to either the Agency IT PMB or a Center IT PMB.

2.3.6 For programs and projects governed under NPR 7120.5, or NPR 7120.8, with an identified IT component subject to IT Authority, the NASA CIO or the Center CIO, as appropriate, will include those elements in the IT management process to ensure overall alignment within Agency IT requirements and direction. The NASA CIO or designee will in turn represent and/or reflect those discussions, findings, and issues with the appropriate Governing Body under the auspices of NPR 7120.5, or NPR 7120.8, to ensure that oversight of the program or project is rationalized to provide assistance to program and project managers in resolving any issues. The agreement shall be documented in the program plan or project plan (or other appropriate document) encompassing the systems of concern. In the event that disagreements cannot be resolved at a lower level, the NASA Associate Administrator will make the final determination.

## 2.4 Program Life Cycle

2.4.1 NASA's strategic management approach requires that all organizations within NASA manage requirements, schedule, and budget according to a program and project management structure. Programs provide the linkage between the Agency's goals and the projects that are the means for achieving them. Programs vary in scope, complexity, cost, and criticality; however, all programs have a life cycle that is divided into two phases:

a. Formulation - Pre-Program Acquisition, in which program requirements are defined, a required funding level is established, and a plan for implementation is designed, all consistent with the NASA Strategic Plan.

b. Implementation - Program Acquisition, Operations, and Sustainment, in which projects are initiated through competition or other processes and their formulation, approval, implementation, integration, operation, and ultimate decommissioning are constantly monitored.

2.4.2 The NASA Program Life Cycle is shown in Figure 2-1. Program formulation and implementation require the preparation and approval (at the appropriate level) of three key documents: a program formulation authorization document (FAD), a program

commitment agreement (PCA), and a program plan. Each is described in subsequent paragraphs.

2.4.2.1 To initiate individual programs, a Mission Directorate or Mission Support Office prepares a program FAD. The program FAD authorizes a program manager to initiate the planning of a new program and to perform the analyses required to formulate a program plan that contains project elements, schedules, risk assessments, and budgets. A FAD template is found in Appendix C. Because the creation of a new program represents a major commitment of the Agency, the FAD requires the approval of the Mission Directorate Associate Administrator (MDAA) or Mission Support Office Official-in-Charge, usually an Assistant Administrator. The program FAD does the following:

a. Contains a statement of purpose for the proposed program and defines its relationship to the Agency's strategic goals and objectives.

b. Establishes the scope of work to be accomplished.

c. Provides initial constraints, including resources, schedule, and program participants within and external to NASA, as well as international partnerships.

d. Defines the approach and resources required to conduct program formulation.

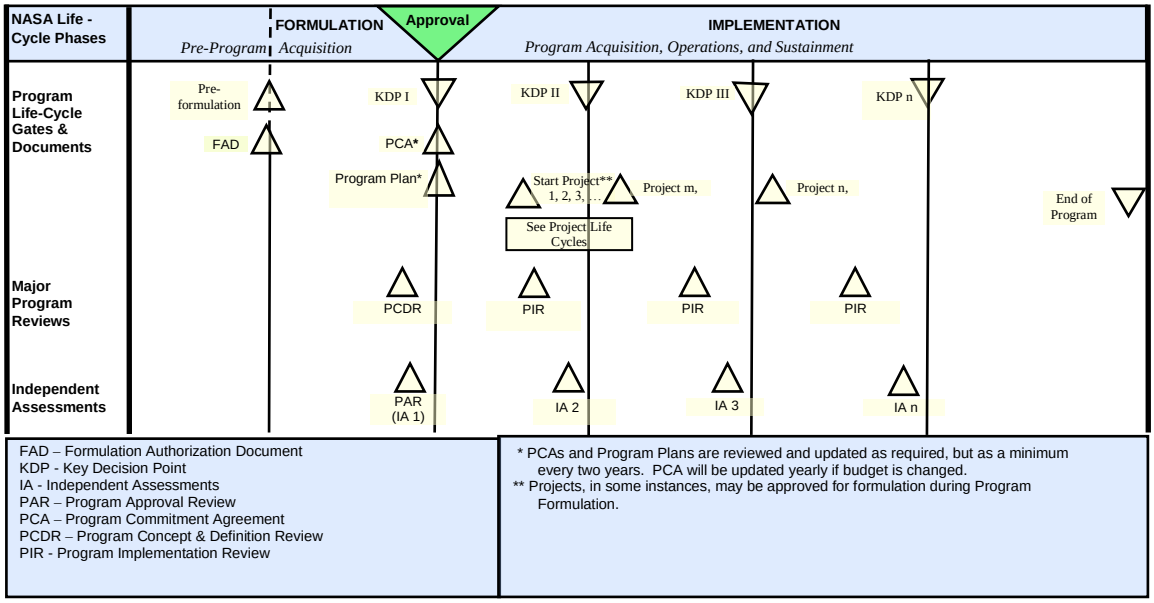



Figure 2-1 Information Technology and Institutional Infrastructure Program Life Cycle

2.4.2.2 The PCA is the agreement between the MDAA or Mission Support Office official in charge and the Decision Authority who authorizes transition from formulation to implementation. If the MDAA is the Decision Authority, the NASA Associate Administrator signs the PCA. If the Mission Support Office Official-in-Charge is the Decision Authority, the NASA Deputy Administrator signs the PCA. The PCA documents the program's objectives, technical performance, schedule, cost, safety and

risk factors, internal and external agreements, independent reviews, and top-level program requirements. A PCA can be considered an executive summary of the program plan and will be updated and approved during the program life cycle. A PCA template is found in Appendix D.

2.4.2.3 The program plan is an agreement between the MDAA or Mission Support Office Official-in-Charge and the program manager. It documents at a high level the program's objectives, scope, implementation approach, the environment within which the program operates, and the commitments of the program. The program plan is used by the program Governing Body in the review process to determine if the program is fulfilling its agreement. The program plan is updated and approved during the program life cycle, as appropriate.

2.4.2.4 The program plan describes how the program will be managed and contains the list of specific projects that are official program elements subject to the requirements in this document. The program plan also documents the program requirements on constituent projects. The requirements are documented in the program plan, in an appendix to the program plan, or in a referenced separately controlled requirements document.

## 2.5 Project Life Cycles

2.5.1 For IT and institutional infrastructure projects, the project life-cycle phases of formulation and implementation are further divided into more incremental pieces that allow managers to assess progress.

2.5.1.1 Project formulation consists of two sequential phases, traditionally denoted as Phases A (Concept Development) and B (Preliminary Design). The primary activities in these phases are to define the project requirements and cost/schedule basis, and to design a plan for implementation (including contractor selection and long-lead procurement). While not formally a part of formulation, some formulation-type activities will naturally occur as part of advanced studies. These fall into a part of the project life cycle known as Pre-Phase A (Concept Studies).

2.5.1.2 Project implementation consists of Phases C, D, E, and F. Approval marks the transition from Phase B of formulation to Phase C of implementation. During Phases C (Final Design and Build) and D (System Assembly, Integration, and Test), the primary activities are developmental in nature, including contract execution. Phase C may include the building and testing of components or subsystems. All activities are executed as per the project plan developed during formulation. The start of Phase E (Deployment, Operations, and Sustainment) marks the transition from system development and acquisition activities to primarily system operations and sustainment activities. The project continues to execute the project plan, adjusted as needed to meet Agency strategic goals. In Phase F (Decommissioning), project systems or assets are taken out of service and safely disposed. Independent assessment activities occur throughout the phases.

2.5.2 To initiate a project, the MDAA or Mission Support Office Official-in-Charge, working through a program office usually provides a small amount of discretionary resources for concept studies (i.e., Pre-Phase A). These pre-formulation activities involve design reference project analyses, feasibility studies, and analyses of alternatives (AoA) that should be performed before a specific project concept emerges. These trade studies are not considered part of formal project planning since there is no certainty that a specific project proposal will emerge. In other cases, such as statute or unsolicited proposal, a project may be initiated in Phase A.

2.5.3 The MDAA or Mission Support Office Official-in-Charge has the authority to initiate a project and begin formulation activities. To effect a project's official entry into formulation, the program manager prepares a project FAD or equivalent. The project FAD is forwarded to the MDAA or Mission Support Office Official-in-Charge for final signature. Once the project FAD is signed, a project formally enters formulation.

2.5.4 Working with the program manager, the project manager and the project team develop the program requirements on the project. If requested by the program manager, the project manager assists in preparing a revised PCA. The project manager is then responsible for the evolution of the project concept and ultimate project success.

2.5.5 NASA places a good deal of emphasis on project formulation because adequate preparation of project concepts and plans is vital to success. During formulation, the project establishes the success criteria, including quantitative metrics, explores the full range of implementation options, defines an affordable project concept to meet project objectives specified in the program plan, develops needed technologies, and develops the project plan. Formulation is an iterative set of activities rather than discrete linear steps, and the phase may be performed many times in the life of a project as needs and conditions change. Formulation continues with interactive execution of its activities, normally concurrently, until formulation output products, like the project plan, have matured and are acceptable to the program manager.

2.5.5.1 The project plan is an agreement between the program manager, the MDAA or the Mission Support Office Official-in-Charge, and the project manager, and if it is performed at a Center, the Center Director. It defines, at a high level, the project's objectives, technical approach, cost, schedule, risks, implementation approach, the environment within which the project operates, and the commitments of the program and project. The project plan is used by the project Governing Body in the review process to determine if the project is fulfilling its agreements. The project plan must be consistent with the program plan. The project plan is updated and approved during the project life cycle to reflect changes in the stated commitments or project-level requirements.

2.5.5.2 The project plan is the key document that captures formulation results. Larger and more complex projects may find it necessary or desirable to write separate control plans to convey project approaches and strategies. In these cases, the project plan summarizes the key elements of such separate plans. In smaller projects, separate and detailed control plans may not be needed to document project approaches. The project

plan itself serves as the single source for such information. A project plan template is found in Appendix F.

2.5.6 There are specialized project life cycles for each type of IT and institutional infrastructure project.

2.5.6.1 The CoF project life cycle consists of the formulation phases of project planning/development and design, and the implementation phases of Construction, Activation, Operations and Maintenance, and Decommissioning. The CoF project life cycle is shown in Figure 2-2 and is further described in NPR 8820.2. The figure shows the full CoF life cycle, but facility engineering terminates at activation when the facility is turned over to its user or owner.

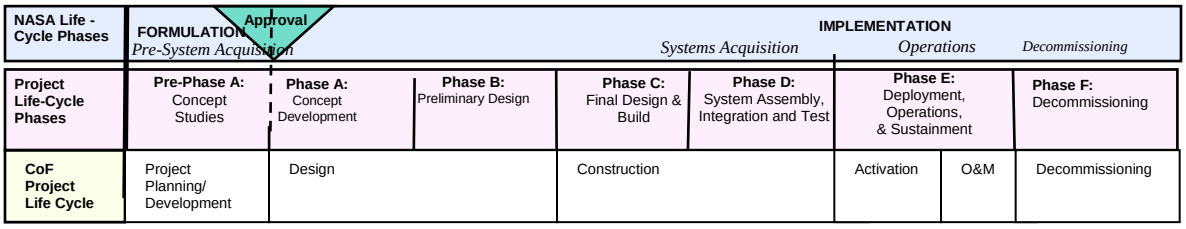



Figure 2-2 CoF Project Life Cycle

2.5.6.2 The ECR project life cycle for restoration projects follows the Environmental Cost Element Structure developed by the Environmental Cost Engineering Committee of the Federal Remediation Technologies Roundtable, a multiagency group that develops and shares concepts and strategies for restoration technologies. The ECR restoration life cycle is shown in Figure 2-3.

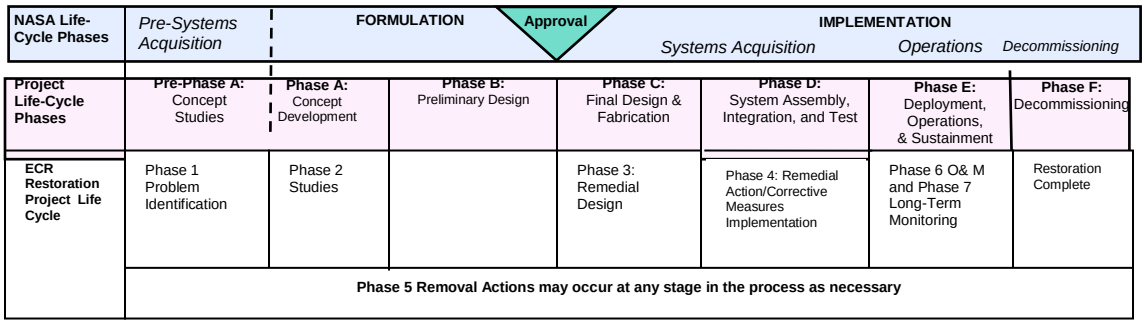
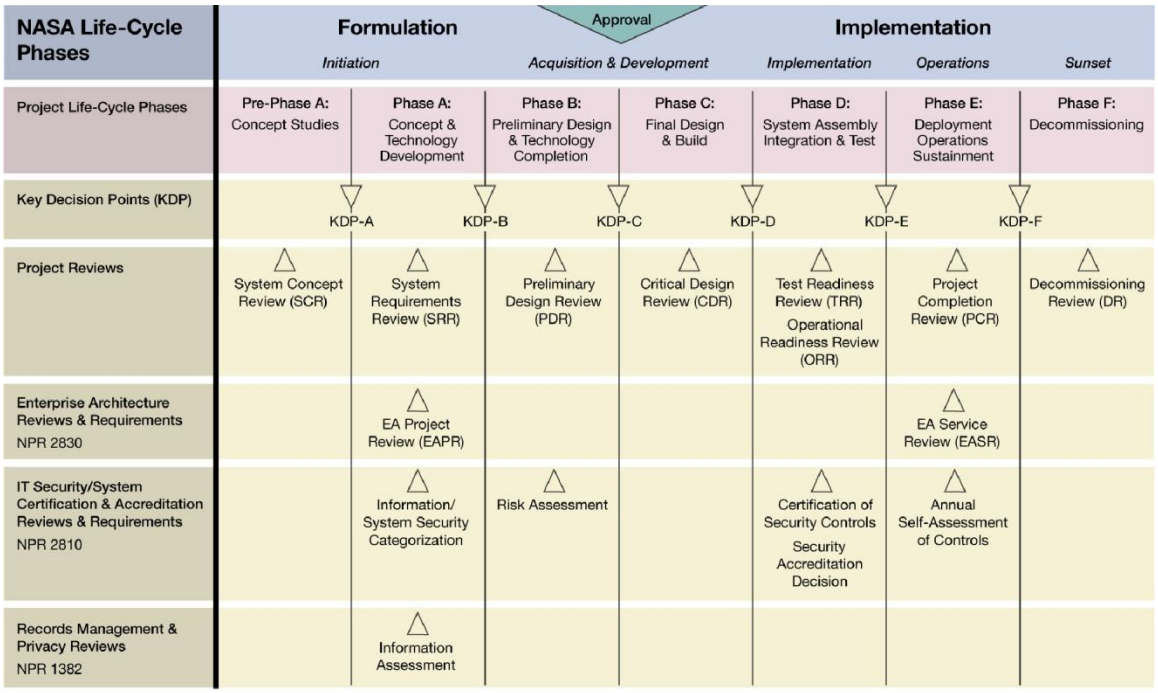



Figure 2-3 ECR Project Life Cycle

2.5.6.3 The IT project life cycle is shown in Figure 2-4. The Pre-Phase A portion of the life cycle is optional; all other phases are required. The IT project life cycle shown in Figure 2-4 is illustrated like a “waterfall” methodology of system development. Individual projects may find that deliverables are better met by following a different methodology, such as iterative development or agile, that has incremental (as opposed to waterfall) characteristics. Projects may conduct their activities in accordance with

nonwaterfall methodologies. However, before doing so, they must present to the Governing Body, early in the formulation phase, the proposed methodology and come to agreement with the Governing Body concerning how the proposed methodology would map to the project oversight requirements of this document. Chapter 4 defines the requirements for IT projects assuming a waterfall methodology. However, the activities described in Chapter 4 will be tailored in the project plan if an iterative development methodology is used. Project managers should refer to NPR 7123.1, NASA Systems Engineering Processes and Requirements, and NPR 7150.2, NASA Software Engineering Requirements, for helpful system and software engineering information.




Note: The EAPR is shown in Phase A, but, may be held at a later phase with the agreement of the EA team.

Figure 2-4 IT Project Life Cycle Reviews and Requirements

2.5.6.4 The OMSI project life cycle is shown in Figure 2-5. Because the scope and scale of OMSI projects vary, individual projects may be managed to a minimal subset of the life cycle, as appropriate to the project, agreed to between the program manager and project manager, and documented through the waiver process described in section 6.2 and the project plan. Chapter 5 defines the requirements for OMSI projects.

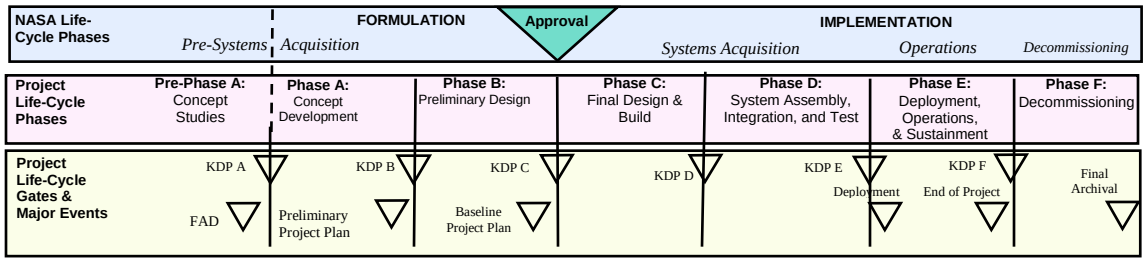



Figure 2-5 Other Mission Support Investment Project Life Cycle

## 2.6 Program and Project Reviews

2.6.1 Program reviews offer an opportunity to add value to program products and to share knowledge by inviting outside experts who can provide confirmation of the approach and/or recommend options. They offer an opportunity to organize, assess, and communicate critical data and information between providers, customers, and stakeholders. See Table 2-2 for program review descriptions.

2.6.2 Project reviews for CoF projects are to be required as described in NPR 8820.2.

2.6.3 Project reviews for ECR projects are to be required as described in NPR 8590.1.

| **Review** | **Description** |
|---|---|
| Program Concept and Definition Review (PCDR) | The PCDR examines the functional and performance requirements defined for the program and its constituent projects, and ensures that the program concept will satisfy the requirements. It examines the proposed program architecture and the flow down to all functional elements of the program. Technology planning with off-ramps (e.g., substitution of old technology) will be described. The preliminary description of management approach and initial budget and schedule will be presented. Risk assessment and management will be presented as well as the initial descope plan. |
| Program Implementation Review (PIR) | PIRs are conducted every two years to examine the program's continuing relevance to the Agency's strategic plan, the progress to date against the approved baseline, the implementation plans for current and upcoming work, budget, schedule, and all risks and their mitigation plans. |

Table 2-2 IT and Institutional Infrastructure Program Reviews

2.6.4 The IT project system life cycle identifies the project reviews associated with each phase in the IT project life cycle. In addition to the project life-cycle reviews, there are IT project unique reviews/assessments for enterprise architecture (EA), system certification and accreditation, and information records management and privacy impact. See Table 2-3 for IT system engineering project life cycle review descriptions. All the reviews described in Table 2-3 are required, with the exception of the system concept review. Refer to Appendix G for information on project-appropriate tailoring of the reviews. All Agency IT projects must adhere to the requirements of NPR 7150.2, and NPD 2820.1, NASA Software Policy.

2.6.5 NPR 2830.1, NASA Enterprise Architecture Procedures, defines a set of criteria that determine those investments that are candidates for an EA review, based on the significance of the investment to the Agency. The goal of an enterprise architecture project review (EAPR) is to ensure that projects have a fundamentally sound business foundation for successful funding and implementation. The goal of an enterprise architecture service review (EASR) is to ensure investments in sustained operations, modifications, upgrades, or enhancements have a fundamentally sound business foundation and are aligned with Agency requirements.

| Review | Description |
|---|---|
| System Concept Review (SCR) | The SCR evaluates the scope, cost benefit analysis, and a recommended solution/concept for the product or service to be delivered for the purpose of receiving approval, formalized via the Formulation Authorization Document, to proceed to the Formulation Phase. It assesses the effect on the "as-is" and "to-be" Enterprise Architecture, and ensures applicable security controls have been considered. The Pre-Phase A life-cycle phase is optional, but the SCR is conducted if the project includes Pre-Phase A. |
| System Requirements Review (SRR) | The SRR examines the functional, technical, performance, and security requirements for the system and elements of the preliminary Project Plan and ensures that the requirements and the selected concept will satisfy the system objectives. |
| Preliminary Design Review (PDR) | The PDR demonstrates that the preliminary design meets all system requirements with acceptable risk and within the cost and schedule constraints and establishes the basis for proceeding with detailed design. It will show that the correct design option has been selected, interfaces have been identified, and verification methods have been described. |
| Critical Design Review (CDR) | The CDR confirms that the maturity of the design is appropriate to support proceeding with implementation, that it was developed in conjunction with stakeholders, demonstrates that the design meets detailed requirements, and identifies open design issues for the purpose of obtaining a decision to proceed with development and deployment. It reviews the technical architecture to ascertain the effect on the enterprise architecture and reviews the application security design and the inclusion of security controls. |
| Test Readiness Review (TRR) | The TRR evaluates the project's readiness to proceed with testing, ensuring adequate schedule, resources, and management processes are in place. It ensures the completion of an integration test plan and the system's readiness for execution of integration testing. |
| Operational Readiness Review (ORR) | The ORR determines that the project is ready to go-live with the system or service: requirements have been met; the functionality, performance, and security controls have been thoroughly tested; procedures are in place for operations; the users have been adequately trained; and, the organization responsible for operations and sustaining engineering is ready to assume responsibility. It ensures a security plan is in place and that system authorization has been received. |
| Project Completion Review (PCR) | The PCR provides assurance that the implemented system is performing as expected and that all necessary support requirements are in place and functioning properly. It confirms that the system is operating properly in its production environment. It is the official closeout of the project and project team. The final project schedule is published and remaining open risks are transferred, closed, or accepted. At the conclusion of the PCR, the system is considered fully operational. |
| Decommissioning Review (DR) | The DR confirms the decision to terminate or decommission the system and assess the readiness for the safe decommissioning and disposal of system assets. |

Table 2-3 IT Project System Engineering Life-Cycle Reviews

2.6.5.1 As of the writing of this document, NPR 2830.1, requires an EAPR prior to any new investment for projects that meet any of the following criteria: over $500,000 in value; affects more than one Center; affects more than 100 people; or if it is a major investment requiring an OMB Exhibit 300. An EASR is required to consider sustained investment or modification/enhancement proposals for projects that meet any of the following criteria: over $1 million in value; affects more than one Mission Directorate; affects more than one Center; affects more than 100 customers; or is a major investment requiring an OMB Exhibit 300. If any of these EAPR or EASR criteria are met, the Chief Enterprise Architect or designee must be notified, and an EA review will be scheduled. Consult NPR 2830.1 for the most current and authoritative description of criteria for the EAPR and EASR.

2.6.5.2 NASA requires that all projects with IT content adhere to the EA reviews outlined in Table 2-4. Refer to NPR 2830.1, for additional requirements on EA reviews. The authority and responsibility for conducting an EA review is determined by the investment category and the life-cycle stage of the investment. In addition, the participation of enterprise architecture staff in the IT system engineering life-cycle reviews described in Table 2.3 is encouraged to further ensure alignment of the project with the enterprise architecture, but their participation is not required.

| **Review** | **Description** |
|---|---|
| EA Project Review (EAPR) | The EAPR ensures that project proposals have a solid business mapping to the program goals they support, create new capabilities for the Agency, and ensure that these proposals do not create capabilities that already exist. A review helps ensure that key sponsors, executives, and stakeholders have the appropriate information detail to make informed investment and funding prioritization decisions. |
| EA Service Review (EASR) | The goal of an EASR is to ensure investments in sustained operations, or which are undergoing modifications, upgrades, or enhancements, have a fundamentally sound business foundation, and are aligned with Agency requirements. This review allows key sponsors, executives, and stakeholders to assess the extent and effectiveness of that service against the program goals it supports. |

Table 2-4 Enterprise Architecture (EA) Reviews for all IT-Related Projects

2.6.6 IT security risks and controls need to be planned for and factored into all decisions during all phases of the IT project life cycle, from Pre-Phase A through decommissioning of the system in Phase F.

2.6.6.1 IT Security assessments are required at various phases in the system development life cycle as shown in Figure 2-4. For example, IT risk assessments and system security categorizations should be initiated during the formulation phase to ensure that security controls are properly designed, developed, implemented, and verified. Additional assessments such as system certification and accreditation are required during the implementation phase of the life cycle to ensure that the selected security controls are effective in the operational environment where the information system is deployed. IT security policy and Federal regulations also require the periodic testing and evaluation of

the security controls in an information system, to be performed with a frequency depending on risk, but no less than annually.

2.6.6.2 NASA requires that all projects with IT content adhere to the IT security reviews and assessments outlined in Table 2-5. Additional IT Security activities and assessments are listed in Chapter 4 and Appendix G. They are consistent with the IT security requirements for NASA as described in NPR 2810.1, Security of Information Technology.

| **Review/Assessment** | **Description** |
|---|---|
| Information / System Security Categorization | Analysis of the information types to be stored and processed in the system to address three IT security objectives (Confidentiality, Integrity, and Availability). Determines the potential impact that a loss would have on the system or functional line of business supported by the information system and the level of IT security required to manage risk to an acceptable level. The result of the analysis is an "IT security category," validated by an appropriate NASA authority. |
| Security Certification | Comprehensive assessment of the management, operational and technical security controls and other safeguards of an IT system. Establishes the extent to which a particular design and implementation meets documented security requirements and any necessary remedial actions. |
| Security Accreditation | Formal declaration by an Authorizing Official that an IT system is compliant with established security requirements, that any residual risks identified during the risk mitigation process are acceptable, and that the system is approved to operate using a prescribed set of safeguards. |
| Annual Self-Assessment of Controls | Self-assessment of each system, performed at least annually, to ensure that security controls are still operating appropriately and that the level of risk to the IT system and the information contained therein remains acceptable. |

Table 2-5 IT Security Reviews and Assessments for All Projects with IT Systems

2.6.7 The ability to properly manage records is an important requirement for IT systems, both to comply with Federal law and to build a history of NASA's decisions for use by future projects. Privacy is also essential for all IT projects that store information about individuals. As such, all IT projects must incorporate the records management and privacy assessment activities, as described in Chapter 4 and Appendix G. The requirements for records management and privacy are detailed in NPR 1441.1, NASA Records Retention Schedules, and in NPR 1382.1, NASA Privacy Procedural Requirements.

2.6.8 Project reviews for OMSI projects depend on the scale and scope of the project. The review plan section of the project plan and the waiver process established in section 6.2 are used to document the reviews that will be conducted by the project. See Table 2-6 for OMSI project review descriptions.

2.6.9 Program and project reviews identified in the life cycles are convened by the Decision Authority (or designee) and the program or project manager. The agenda and ground rules for the review are jointly developed and a review board chairperson is appointed. The chairperson organizes the review board and submits the names of

proposed members to the Decision Authority and program or project manager for joint approval. Proposed members must be independent of the program and project and some members must be independent of the Mission Directorate or Mission Support Office responsible for the program or project. Members of review boards are chosen based on their combined management, technical, safety and mission assurance, and/or educational expertise and/or qualifications (i.e., required certified, civil servant, etc.); their objectivity; and their ability to make a broad assessment of the implementation of the program or project that employs numerous technical and other disciplines.

| **Review** | **Description** |
|---|---|
| System/Project Concept Review (SCR) | The SCR establishes that the baseline project requirements are understood and the requirements for sub-projects (if any) have been determined. It also verifies that the envisioned system/project design will satisfy the requirements. |
| System/Project Requirements Review (SRR) | The SRR examines the functional and performance requirements for the system/project and the preliminary Project Plan and ensures that the requirements and selected concept will satisfy the project goals. |
| Preliminary Design Review (PDR) | The PDR demonstrates that the preliminary design meets all system/project requirements with acceptable risk and within cost and schedule constraints, and establishes the basis for proceeding with detailed design. It will show that a correct design option has been selected and verification methods have been described. Baseline costs and schedules, as well as all risk assessment, management systems, and metrics, will be presented. |
| Critical Design Review (CDR) | The CDR demonstrates that the maturity of the design is appropriate to support proceeding with full-scale fabrication, assembly, integration, and test, and that the technical effort is on track to complete the system development and operations in order to meet performance requirements within the identified cost and schedule constraints. Progress against management plans, budget, and schedule, as well as risk assessment will be presented. |
| Operational Readiness Review (ORR) | The ORR examines the actual system characteristics, test results, and the procedures used in the system or product's operation and ensures that all system and support hardware, software, personnel, procedures, and user documentation accurately reflects the deployed state of the system. |
| Decommissioning Review (DR) | The purpose of the DR is to confirm the decision to terminate or decommission the system and assess the readiness for the safe decommissioning and disposal of system assets. |

Table 2-6 OMSI Project Reviews

2.6.10 The MDAA, Mission Support Office Official-in-Charge or program manager may also require special reviews as the need is determined. Circumstances that may warrant these special reviews include variances with respect to technical, cost or schedule requirements, inability to develop an enabling technology, or some unanticipated change to the program or project baseline. The process followed for these reviews is the same as for other reviews. The review team will be dissolved following resolution of the issue(s) that triggered the review.

2.6.11 For all types of projects in the scope of this document, if the Decision Authority is considering the termination of a project at any time in Phases B, C, D, or E, then a special termination KDP may be requested. Circumstances such as the anticipated inability of the project to meet its commitments, an unanticipated change in Agency strategic

planning, or an unanticipated change in the NASA budget may be instrumental in triggering a termination KDP. The Decision Authority commissions an Independent Assessment (IA), and following its completion, the project Governing Body holds a Termination Review.

## 2.7 Approving and Maintaining Program and Project Plans, Baselines, and Commitments

**2.7.1** Programs/projects must present to the governing IT PMB at KDP I/KDP B or earlier their proposal for how the project baseline will be developed and managed, addressing explicitly how progressive elaboration inherent in these kinds of methodologies will be addressed in baseline planning and the baseline request.

2.7.1.1 The Program/Project baseline required shall include, at a minimum: a description of the business need for the proposed baseline; a description of performance measures, including baseline performance and proposed target performance; the project Work Breakdown Structure (WBS) to level 3 and consistent with the standard level 2 WBS described in Appendix H; the lifecycle cost estimate; and, when required the Joint Cost and Schedule Confidence Level (JCL).

2.7.1.2 Programs/projects shall be formally baselined at IT PMB KDP I/KDP C. KDPI/KDPC is preceded by an Independent Assessment (see Section 2.8) which provides the governing IT PMB with information that assists it in making recommendations to the Decision Authority. Projects with a life cycle cost of less than $1M are not required to conduct independent assessments unless so directed by the Decision Authority due to the project's level of risk, impact, or visibility. At KDP I/KDP C, the total life cycle cost estimate of the program or project is no longer documented as a range, but instead as an estimated number. The life cycle cost (see Appendix A for full definition) estimate includes all costs, including UFE, for development (excluding Pre-Phase A) through operation to disposal.

**2.7.2** At program or project key decision points (KDP), the Decision Authority (DA) determines whether and how the program or project proceeds into the next lifecycle phase and approves any additional actions. The DA determination is made after review of supporting material, completing discussion with all parties, and receiving the IT PMB KDP recommendation for a project to be permitted to move into the next lifecycle phase. These recommendations are based upon the realism and completeness of the proposed baseline, taking into account cost, schedule, technical, and programmatic risks, and recommendations of the Independent Assessment team, if applicable.

2.7.2.1 The Decision Memorandum (Appendix I) 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; and any additional actions that resulted from the KDP.

2.7.2.2 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. 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. A significant divergence from the Management Agreement must be accompanied by an amendment to the Decision Memorandum.

2.7.2.3 During Formulation, the Decision Memorandum shall establish a target life cycle cost range (and schedule range, if applicable) as well as a Management Agreement addressing the schedule and resources required to complete formulation.

2.7.2.4 The Decision Memorandum also documents any additional resources beyond those explicitly estimated/requested by the program/project (e.g., additional schedule margin) when the Decision Authority determines that this is appropriate. Additional resources include Unallocated Future Expenses (UFE) assigned to the program or project manager. Management control of some UFE may be retained above the level of the project (i.e., Agency or program). (See Figure 2-5, Example of Agreements).

2.7.2.5 The lifecycle cost estimate updated in the Decision Memorandum at KDP C becomes the Agency Baseline Commitment (ABC) and is used to measure the Agency's performance during the Implementation Phase. The ABC for projects with a life cycle cost of $250 million or more, and financial management support systems that will obligate more than $500,000 annually, forms the basis for the Agency's external commitment to the Office of Management and Budget (OMB) and Congress.

2.7.2.5.2 Between KDPs, the Management Agreement may be changed without amending the Decision Memorandum if there is a change in UFE allocation to the program or project that does not affect the approved life cycle cost estimate. In this case, changes to the Management Agreement will be documented and signed by the Mission Directorate and the program manager or the program manager and project manager. A record of the changed Management Agreement will be attached to the Project Plan (and Program Plan as applicable) and for projects with a life cycle of $250 million or more and financial management support systems that will obligate more than $500,000 annually, and reported to the Chief Financial Officer (OCFO) in a timely manner.

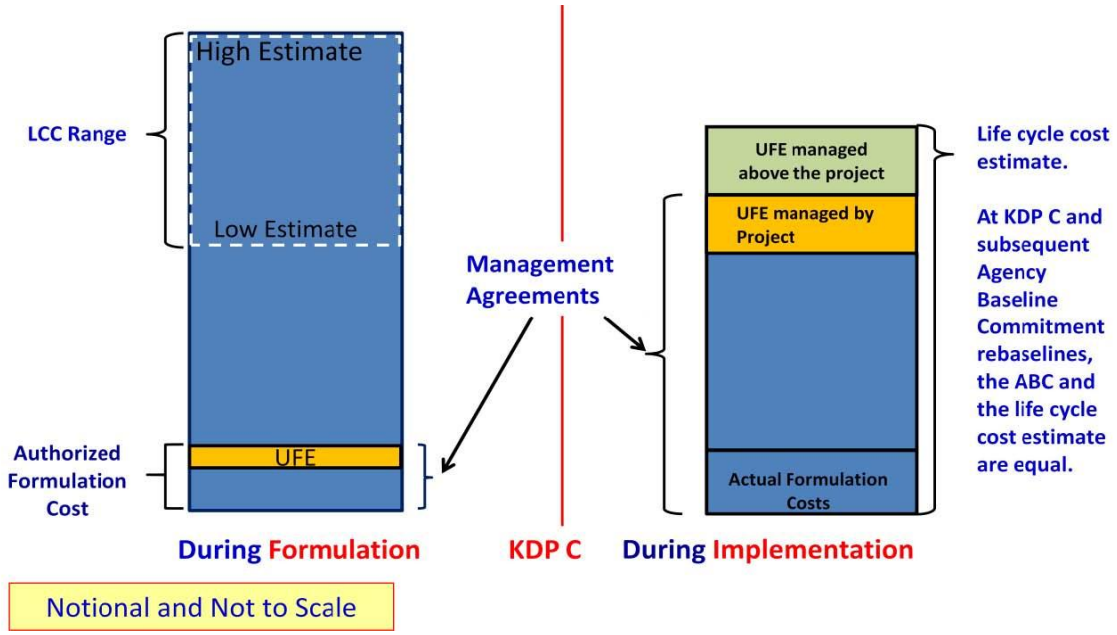



**Figure 2-5 Example of Agreements and Commitments in Terms of Cost for Projects**

2.7.3 Programs or projects shall be rebaselined when, (1) there is a significant change in investment goals (scope, requirements, objectives) resulting from internal or external management decisions, or changes in funding level or availability of funds (e.g. extended continuing resolution), or contracting (including contractual protests); (2) the current baseline is no longer useful as a management tool for realistic performance measurement (cost, schedule or scope) as variances are so high that they lose meaning; or (3) The Decision Authority judges that the project scope[1] defined in the Agency Baseline Commitment has been changed or the project has been interrupted.

2.7.3.1 When an ABC is rebaselined, the Decision Authority will direct that a Rebaseline Review be conducted by the governing IT PMB. The Decision Authority will determine the scope and depth of the review. The project shall present a rebaselining request to the governing IT PMB following the requirements levied by the governing IT PMB and that include, at a minimum: a description of changes to the project's performance goals and measures; summary of the changes in the investment's scope and capabilities; identification of contributing problems, why the current plan is not feasible, and remediation plans to prevent problem recurrence, if applicable; for major investments, updates to Analysis of Alternatives of the chosen alternative's cost data (or new analysis if any of the original alternatives are no longer valid), and related recommendation; changes to the project's WBS and cost estimate detailing variance from the most recently approved baseline; and, description of any contract implications or necessary actions assuring that the baseline accurately reflects contracting constraints and risks. The assessment must demonstrate to the governing IT PMB a high probability of success and

[1] "Project scope" has previously been defined as Level 1 requirements.

a benefit-cost result that justifies continued funding after comparison with the other alternatives in the portfolio and budget limitations. The governing IT PMB will recommend to the Decision Authority whether the project should be continued under a new ABC, whether a revised approach should be considered, or the project terminated. If the recommendation is to approve a revised ABC, the IT PMB will also recommend how future project progress should be monitored. The results of the Rebaseline Review will be documented in a new Decision Memorandum if the revised ABC is approved by the Decision Authority.

2.7.3.2 For major IT investments with an OMB 300, the project will update the Federal IT Dashboard within 30 days of approval of a new baseline or revision to an existing baseline to reflect the investment's current baseline. OMB will furnish the requirements for updates, but the following at a minimum will be expected: date of Agency approval of the baselining/rebaselining event; updated cost and schedule information for remaining project work; reason for a baseline change; and brief summary of the rationale used for the baselining/rebaselining event, including changes to scope and/or capabilities. The Agency OCIO will verify the new data. The update to the IT dashboard will be considered notification to OMB, and projects will report against the submitted baseline.

2.7.3.3 For major IT investments, the project will update the Federal IT Dashboard cost and schedule data on a monthly basis and performance measurement data when actual data has been measured (but annually, at a minimum). CIO Assessments and contract data will be updated when significant changes occur with the investment.
For major IT investments, the project will update the Federal IT Dashboard to provide Earned Value reports on contracts requiring EVM on a monthly basis to include the following data elements at a minimum: Associated Unique Project Identifier; FPDS Contract Identifier; Planned Start and End Dates; Budget At Completion; Cumulative to Date (Budgeted Cost of Work Scheduled, Budgeted Cost of Work Performed, Actual Cost of Work Performed); Cost Variance, Cost Performance Indicator; and, Schedule Variance, Schedule Performance Indicator.

## 2.8 Independent Assessment (IA)

2.8.1 IAs occur as part of the program and project KDP processes. The Decision Authority works with the program manager, project manager, and the cognizant individuals within the Mission Directorate or Mission Support Office, and the Independent Program and Cost Evaluation, as necessary, in developing the IA agenda and ground rules and selecting the review chairperson. Review team members are independent of the program and project line of authority. Program and project IAs are separate from the program and project reviews and are generally conducted in conjunction with them.

2.8.2 The first program IA is the Program Approval Review (PAR) which occurs in conjunction with or following the PCDR. This assessment is conducted to ensure that major issues are understood and resolved prior to KDP I where program approval is given. The purpose and description of this review is listed in Table 2-7.

2.8.3 Other program IAs are conducted at least every two years following program approval. The IA looks at program performance and adherence or progress to meeting Agency goals.

| Review | Description |
|---|---|
| Program Approval Review (PAR) | The PAR examines the overall program concept, its relevance to the Agency strategic plan, the technical and management approaches, and the readiness of the program to provide oversight into the formulation of the initial project(s) of the program. Key criteria include: the feasibility and maturity of the Technical Concept/Program Architecture; clarity, completeness, and consistency of the program requirements, and the flow down of these requirements to initial and subsequent projects; the state of interface identification; identification of technology development needs; identification of risks and mitigation approaches; program test and verification policy; adequacy of resources to implement the initial project(s) in the program, including budget, reserves, and reserves policies; sufficiency of program management staffing and control mechanisms to manage initial and future constituent projects and satisfy external communication and reporting requirements throughout the expected lifetime of the program. |

Table 2-7 Information Technology and Institutional Infrastructure Program Approval Review

2.8.4 The first required project IA is the Non-Advocate Review (NAR) and occurs in conjunction with or following the PDR. In addition, for all new major projects with IT ("major IT projects"), OMB has directed an Independent Validation for Reasonableness (IVR) of cost, schedule, and performance objectives before beginning project development. This requirement also applies to ongoing major IT projects that have development, modernization, and enhancement efforts. NASA implements this requirement as part of the NAR. The criteria for what constitutes a major IT project changes from year to year depending upon the Agency's needs and guidance provided by OMB. Typical criteria include high-executive visibility or special management attention needed due to its importance to the NASA mission/function (regardless of cost), significant program or policy or privacy implications, a financial management support system that will obligate more than $500,000 annually, and others. The NASA Office of the CIO (OCIO), working in conjunction with its IT governance structure, designates a particular project as a major IT project during the capital planning process when the initial decision is made to approve the formation of a project. Following that determination, the OCIO informs the program/project manager that the project is a major IT project and that an IVR and additional reporting associated with a major IT project are required. Since the criteria for a major IT project may change from year to year, the OCIO may inform a program/project manager that a project which has been underway for some time is now considered to be a major IT project and that the IVR and additional reporting may be required, based on where the project is in its life cycle. Table 2-8 provides the purpose and description of the project NAR.

2.8.5 Other project IAs generally occur with or following project reviews. The IAs look at project cost, schedule and performance, and risk management processes. The required project IAs are documented in the review plan section of the project plan. For large-scale projects (>250M LCC), an IA is required for each KDP. Project IAs may also be required to support special reporting requirements from external sources such as OMB and NASA authorization and appropriations laws.

2.8.6 If the Decision Authority is considering the termination of a project in Phases B, C, D, or E, then an IA is conducted for the termination KDP.

2.8.7 Results of all IAs culminate at the Governing Body review where the program, project, Mission Directorate or Mission Support Office, and the IA team present their status, findings, and recommendations.

| Review | Description |
|---|---|
| Non-Advocate Review (NAR) | The NAR is an independent review of projects conducted at the end of Formulation (Phase B). It provides Agency management with an independent assessment of the project to proceed to Implementation (Phase C). The review provides the Governing Body with information that assists it in making recommendations to the Decision Authority. For major IT projects, this review also includes the IVR. Upon successful completion of this review process, a project baseline is established. Review criteria include assessment of the project's preliminary design, plans for implementation, and final implementation documentation. |

Table 2-8 Information Technology and Institutional Infrastructure Project Non-Advocate Review

2.8.8 To remain consistent with other NASA policies, members of independent review boards, independent assessment teams, and independent audits required by NPR 7120.7 should be free from organizational and personal conflicts of interest.

2.8.9 Individuals employed by an organization that institutionally supports the program or project (e.g., a NASA Center, Mission Directorate, or contractor) may serve as a member of an Independent Assessment Team when the following requirements are met:
(1) The service of the individual should be based upon the unique scientific, technical, or programmatic expertise that the individual brings to the review
(2) With regard to civil servant members, the individual and the individual's supervisory chain should not be located within the chain of command for programmatic-level decisions made at the program or project level; and
(3) There must be a specific determination during the Independent Assessment appointment process that service by the individual will not compromise the independence or objectivity of the review.

2.8.10 The Independent Assessment team either validates the project's proposed baseline or makes recommendations to the IT PMB concerning steps the project should take to ensure that the proposed baseline is achievable.

## CHAPTER 3. Program and Project Management Roles and Responsibilities

### 3.1 Roles and Responsibilities

3.1.1 The roles and responsibilities of senior management are defined in NPD 1000.0, and NPD 1000.3, The NASA Organization. The key roles and responsibilities specific to program and projects consistent with the process described in section 1.2 can be summarized as follows:

a. NASA Administrator - approves assignment of large (greater than $100 million) projects to performing organizations such as Mission Support Offices or Centers.

b. NASA Deputy Administrator - responsible for operations at the Agency level, chairs the OMC, is the KDP Decision Authority for programs and projects governed by the OMC, and approves the PCA for projects governed by the OMC.

c. NASA Associate Administrator - responsible for the technical and programmatic integration of program portfolios at the Agency level, chairs the Agency PMC, is the KDP Decision Authority for programs and projects governed by the Agency PMC, and approves the PCA for projects governed by the Agency PMC.

d. Chief Engineer - responsible for policy, oversight, and assessment of NASA engineering and program/project management capabilities, and principal advisor to the Administrator on matters pertaining to the technical capability and readiness of NASA programs and projects.

e. Mission Directorate Associate Administrator - responsible for managing program portfolios within the Mission Directorate, is the KDP Decision Authority for programs and projects governed by the Mission Directorate, and is responsible for all budgets, schedules, program requirements, and program requirements on projects within the Mission Directorate.

f. Chief, Safety and Mission Assurance - assures the existence of robust safety and mission assurance processes and activities through the development, implementation, assessment, and functional oversight of safety, reliability, maintainability, and quality policies and procedures; serves as principal advisor to the Administrator and other senior officials on safety, reliability, maintainability, and quality assurance matters; performs independent program and project compliance verification audits; and implements the SMA technical authority process.

g. Mission Support Office Official-in-Charge - responsible for managing program portfolios within the Mission Support Office, is the KDP Decision Authority for programs and projects governed by the Mission Support Office, and is responsible for all

budgets, schedules, program requirements, and program requirements on projects within the Mission Support Office.

h. NASA Chief Information Officer (CIO) - responsible for ensuring that NASA's information assets are acquired and managed consistent with Federal policies, procedures, and legislation and that the Agency's Information Resource Management (IRM) strategy is in alignment with NASA's vision, mission, and strategic goals, is principal advisor to the Administrator on matters pertaining to IRM, and is responsible for establishing IT policies, promoting standards, and developing a secure architecture to support scientific, engineering, and administrative information requirements. Implements the Information Technology Authority process and serves as the Institutional Authority for Information Technology as described in section 3.4.

i. Center CIO - responsible for ensuring that Center IT plans, support, services, architectures, policies, procedures, standards, guidelines, and practices support the Agency's missions in a manner that aligns with Federal and Agency requirements and directions, and in particular, aligns with the Agency enterprise architecture. Supports the Agency CIO in accordance with the NASA IT governance model.

j. Program Manager - responsible for the formulation and implementation of the program per the governing agreement with the sponsoring Mission Directorate or Mission Support Office and all applicable NPDs, NPRs, and other Agency policy documents.

k. Project Manager - responsible for the formulation and implementation of the project per the governing agreement with the program manager.

## 3.2 Program and Project Managers

3.2.1 The program manager works in concert with the project manager, who may be supported by one or more NASA Centers. Each, however, is responsible and accountable to the Mission Directorate and/or Mission Support Offices for the safety, technical integrity, performance, and success of the program or project, while also meeting programmatic (cost and schedule) commitments and institutional requirements. Accomplishing this requires a breadth and depth of skills, so the program and project manager must be knowledgeable about governing laws, acquisition regulations, policies affecting the project, training of direct-report personnel, risk management, resource management, test facilities, software management, and other aspects of program and project management.

3.2.2 It is important for the program manager and project manager to coordinate early and throughout the project's life cycle with mission support organizations at NASA Headquarters and the Centers involved in development and/or implementation of the program/project. These mission support organizations include legal, procurement, security, finance, export control, human resources, public affairs, international affairs, property, facilities, environmental, IT security, and others. They provide essential

expertise and ensure compliance with relevant laws, treaties, executive orders, and regulations.

3.2.3 The program and project manager establish periodic status reporting processes and mechanisms. Project thresholds are established for cost and schedule, which if exceeded, the project manager will provide immediate written notice to the program manager. These thresholds are documented in the project plan.

### 3.3 Process for Handling Dissenting Opinions

3.3.1 NASA teams must have full and open discussions with all facts made available in order 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.

3.3.2 Unresolved issues of any nature (e.g., programmatic, safety, engineering, acquisition, accounting, etc.) within teams should be quickly elevated to achieve resolution at the appropriate level. At the discretion of the dissenting person(s), a decision may be appealed to the next higher level of management for resolution.

3.3.3 When appropriate, the concern is documented by including agreed-to facts, discussion of the differing positions with rationale and impacts and the parties' recommendations, approved by the representative of each view, concurred on by affected parties, and provided to program/project management with notification to the second higher level of management. In cases of urgency, an oral presentation (including the information stated above) with all affected organizations in attendance and with advance notification to the second higher level of management may be utilized with documentation followup.

3.3.4 Management's decision/action on the memorandum (or oral presentation) is documented and provided to the dissenter and to the notified managers and becomes part of the program/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.

### 3.4 Information Technology Authority

3.4.1 NPD 1000.0, describes Mission Support Authorities as the designated "official voices" of their institutional areas and the associated requirements established by NASA policy, law, or other external mandate. These authorities are asserted through leadership, horizontally (across Headquarters) and vertically (Headquarters to Centers, and within Centers). The NASA CIO exercises Mission Support Authority for IT, and is the "IT Authority." The corresponding process is designated as IT authority (where "authority" is not capitalized, to distinguish between the process and the person exercising the authority).

3.4.2 The need for IT authority stems from the inclusion and importance of IT in almost all Agency programs and projects. The scope of IT authority includes all IT with the exception of software engineering. The Office of the Chief Engineer establishes policy and technical standards for software engineering and has included software engineering in its engineering technical authority process. The Office of Safety and Mission Assurance establishes the policy and technical standards for software safety and software assurance.

3.4.3 The requirements levied by this document on IT programs and projects in its scope constitute the exercise of IT authority in the area of program and project management. Additional aspects of IT authority will be included in NPR 2800.1, Managing Information Technology.

# CHAPTER 4. Information Technology (IT) Program and Project Requirements by Phase

## 4.1 IT Programs - Formulation Phase

4.1.1 Purpose: The purpose of program formulation activities is to establish a cost-effective program that meets Agency and Mission Directorate/Mission Support Office goals and objectives. The program FAD authorizes a program manager to initiate the planning of a new program and to perform the analyses required to formulate a program plan. Major reviews leading to approval at KDP-I are the PCDR, and the program Governing Body review (see Figure 2-1) .

4.1.2 Requirements: During program formulation, the program manager and the program team shall:

a. Support the Mission Directorate or Mission Support Office in developing and obtaining approval of the FAD, PCA, and the Planning, Programming, Budgeting, and Execution (PPBE) process.

b. Prepare and obtain approval of the program plan that follows the template in Appendix E.

c. Obtain approval of interagency and international agreements.

d. Plan, prepare for, and conduct a PCDR.

e. Develop all required KDP-I gate products as indicated in Table 6-1.

f. Plan, prepare for, and support the program Governing Body review prior to KDP-I.

## 4.2 IT Programs - Implementation Phase

4.2.1 Purpose: During implementation, the program manager works with the stakeholders and the constituent projects to execute the program plan in a cost-effective manner on schedule. PIRs and periodic independent assessments ensure that the program continues to contribute to Agency and Mission Directorate or Mission Support Office goals and objectives within funding constraints.

4.2.2 Requirements: During program implementation, the program manager and the program team shall:

a. Execute the program plan.

b. Conduct planning, program-level systems engineering, and integration, as appropriate to the program.

c. Support the Mission Directorate or Mission Support Office in initiating the projects selection process.

d. Support the MDAA or Mission Support Office Official-in-Charge in the selection of projects, either assigned or through a competitive process.

e. Approve project FADs and project plans.

f. Plan, prepare for, and conduct biennial PIRs.

g. Support Governing Body reviews prior to KDP-II, -III, -IV, etc.

h. Support the MDAA or Mission Support Office Official-in-Charge in updating the PCA.

i. Update the program plan.

j. Provide oversight of the projects within the program and report their status periodically.

k. Review project PPBE process inputs and prepare program PPBE process input.

l. Develop technologies and common solutions that cut across multiple projects within the program.

m. Develop all required gate products as indicated in Table 6-1 prior to KDP-II, -III, -IV, etc.

n. Plan, prepare for, and support the program Governing Body reviews prior to KDP-II, -III, -IV, etc.

### 4.3 IT Projects – Pre-Phase A

4.3.1 Purpose: During Pre-Phase A, a pre-project team studies a broad range of system-enabling concepts that contribute to program and Mission Directorate or Mission Support Office goals and objectives. These advanced studies along with interactions with customers and other potential stakeholders help identify a promising concept and tentative project-level requirements. The team conducts an enterprise architecture review with the NASA Chief Enterprise Architect or designee and assesses project alignment with gaps in the “As-Is” and “To-Be” architectures. These activities are focused toward a SCR and KDP-A. Pre-Phase A is optional; all other phases of the IT project life cycle are required.

4.3.2 Requirements: If a Pre-Phase A is conducted, then the pre-project manager and team shall:

a. Obtain an approved project FAD.

b. Support the program manager in the development of the preliminary program requirements on the project.

c. Consider naming an Information System Security Official to assist the team in identifying IT security issues with candidate system concepts. Naming an Information System Security Official at this phase of the project is optional, but recommended.

d. Develop a preliminary system concept.

e. Working with the Agency or Center Enterprise Chief Architect staff, conduct an assessment of how the system fits into NASA's EA.

f. Perform a preliminary IT security risk assessment of the system in accordance with NPR 2810.1, Security of Information Technology.

g. Prepare a preliminary assessment of the security categorization of the information to be hosted on the system, as required by NPR 2810.1.

h. Plan, prepare for, and conduct the SCR shown in Figure 2-4 in accordance with Appendix G of this document.

i. Baseline work agreements for Phase A.

j. Prepare all required KDP-A gate products identified in Table 6-2.

k. Plan, prepare for, and support the project Governing Body review prior to KDP-A.

## 4.4 IT Projects – Phase A

4.4.1 Purpose: During Phase A, a project team is formed to fully develop a system concept and begin development of needed technologies. This work, along with interactions with customers and other potential stakeholders, helps to finalize a system concept and the project-level requirements. These activities take place in preparation for SRR. The phase culminates in KDP-B.

4.4.2 Requirements: During Phase A, the project manager and project team shall:

a. Obtain an approved project FAD, if a pre-Phase A was not conducted.

b. During this and subsequent life-cycle phases, follow the requirements of NASA Interim Directive (NID)-9250, Identifying Capital Assets and Capturing Their Costs.

c. Support the program manager in the development of the baseline program requirements on the project.

d. Establish the project structure.

e. Name an Information System Security Official responsible for ensuring that the information system complies with Federal and NASA IT security requirements.

f. Initiate the development of Memorandums of Understanding (MOUs)/Memorandums of Agreement (MOAs) with domestic external partners, as needed.

g. Work with the program manager and HQ Office of External Relations to initiate international agreements, as needed.

h. Complete an AoA and select a preferred, baseline system concept.

i. Develop preliminary system-level (and lower-level, as needed) requirements.

j. Develop a preliminary system operations concept.

k. Working with the Agency or Center Enterprise Chief Architect staff, determine how the system interfaces with, replaces, and/or supports other systems documented in the NASA EA.

l. Prepare the preliminary software development/management plan required by NPR 7150.2.

m. Plan, prepare for, and conduct the SRR shown in Figure 2-4 in accordance with Appendix G of this document.

n. Plan, prepare for, and conduct the EAPR described in NPR 2830.1.

o. Conduct the Information/System Security Categorization required by NPR 2810.1.

p. Further assess the information to be hosted on the system, including:

(1) Determining if the system data includes personally identifiable information and thus requires privacy protection in conformance with statutes governing privacy information and enabling Agency policy.

(2) Developing or selecting the records retention for all information related to the project and to be hosted on the system in accordance with the requirements of NPR 1441.1.

q. Determine the IT security controls that apply to the system in accordance with NPR 2810.1.

r. Prepare a preliminary project plan that follows the template in Appendix F.

s. For contracts requiring Earned Value Management (EVM) (see Appendix F, paragraph 3.1.e), conduct required Integrated Baseline Reviews (IBRs).

t. Develop and document a preliminary integrated baseline for all work to be performed by the project that includes the following:

(1) A preliminary high-level WBS and associated WBS dictionary, preliminary integrated master schedule, preliminary life-cycle cost estimate, workforce estimates, and the project's technical baseline, all consistent with the program requirements levied on the project.

(2) The preliminary life-cycle cost estimate uses the latest available accounting guidance and practices, and including IT security costs.

(3) The preliminary life-cycle cost estimate includes reserves, along with the level of confidence estimate provided by the reserves based on a cost-risk analysis.

(4) The preliminary cost estimate is to be time-phased by Government Fiscal Year (GFY) to WBS Level 2:

(i) For internal use software projects, develop the Level 2 WBS to meet the requirements of NASA's NPR 9250.1B (Chapter 5), Property, Plant, and Equipment and Operating Materials and Supplies.

u. Incorporate life-cycle risk management principles in the project plan in accordance with NPR 8000.4, Risk Management Procedural Requirements.

v. Working with the appropriate support organizations, develop an initial IT infrastructure assessment of project needs and Agency-wide and external capabilities to meet infrastructure needs.

w. Baseline work agreements for Phase B.

x. Develop all required KDP-B gate products as indicated in Table 6-2.

y. Plan, prepare for, and support the project Governing Body review prior to KDP-B.

## 4.5 IT Projects – Phase B

4.5.1 Purpose: During Phase B, the project team completes its preliminary design and technology development. These activities are focused toward completing the project plan and PDR. In addition, the NAR is supported prior to briefing the project Governing Body. The phase culminates in KDP-C.

4.5.2 Requirements: During Phase B, the project manager and the project team shall:

a. Support the program manager in the update of the baseline program requirements on the project.

b. Finalize external agreements, such as interagency and international agreements, procurements, MOUs, and facility resources.

c. Implement the preliminary project plan.

d. Develop the top-level system preliminary technical architecture, identifying the "as-is" and "to-be" architectures as they relate to the NASA EA.

e. Baseline the system-level requirements and develop the subsystem and lower-level technical requirements leading to the PDR baseline.

f. Develop a set of system and associated subsystem preliminary designs, including interface definitions, and document this work in a preliminary design document.

g. Develop the baseline operations concept.

h. Complete make-or-buy decisions and initiate long-lead procurements.

i. Conduct risk analyses and use the results to make IT risk informed design decisions in accordance with NPR 8000.4, and document the decisions in the risk management control part of the project plan.

j. Develop a list of descope options, if applicable.

k. Update the preliminary software development/management plan required by NPR 7150.2.

l. Plan, prepare for, and conduct the PDR shown in Figure 2-4 in accordance with Appendix G of this document.

m. Complete and obtain approval of the baseline project plan that follows the template in Appendix F.

n. Develop, document, and maintain an integrated project baseline for all work performed by the project:

(1) The project's integrated baseline shall include the project WBS and WBS dictionary, as detailed in Appendix H.

(2) The project's integrated baseline includes the integrated master schedule, baseline life-cycle cost estimate, workforce estimates, and the PDR technical baseline, all consistent with the program requirements levied on the project.

(3) The baseline life-cycle cost estimate uses the latest available accounting guidance and practices, and includes IT security costs.

(4) The baseline life-cycle cost estimate includes reserves, along with the level of confidence estimate provided by the reserves based on a cost-risk analysis.

(5) The baseline life-cycle cost estimate is to be time-phased by GFY to WBS Level 2:

(i) For internal use software projects, develop the Level 2 WBS to meet the requirements of NASA's NPR 9250.1B Property, Plant, and Equipment and Operating Materials and Supplies, Chapter 5, Internal Use Software.

o. For contracts requiring EVM, conduct required IBRs.

p. Conduct the IT security risk assessment for the system required by NPR 2810.1.

q. Determine whether the project is subject to an IVR based on criteria issued by the NASA OCIO and posted on the OCIO Web site. For those projects subject to an IVR, prepare for and support the IVR as part of the NAR.

r. Plan, prepare for, and support the NAR independent review team.

s. Baseline work agreements for Phase C.

t. Develop the gate products required for KDP-C as indicated in Table 6-2.

u. Plan, prepare for, and support the project Governing Body review prior to KDP-C.

## 4.6 IT Projects – Phase C

4.6.1 Purpose: During Phase C, the project completes the design that meets the detailed requirements, begins early production of system components requiring long-lead time, and makes acquisitions that may be required.

4.6.2 Requirements: During Phase C, the project manager and the project team shall:

a. Implement the baseline project plan.

b. Develop the baseline system technical architecture, identifying the "as-is" and "to-be" architectures as they relate to the NASA EA.

c. Develop baseline software architecture and detailed designs, including the design of IT security controls required by NPR 2810.1.

d. Develop/procure long lead-time software and hardware.

e. Develop requisite system and subsystem test beds needed for qualification and acceptance testing of the system(s).

f. Initiate the qualification and acceptance testing of systems and/or subsystems.

g. Initiate all operational support and other enabling developments (e.g., facilities, equipment, updated databases), including a preliminary operations handbook to support the operations team.

h. Plan, prepare for, and conduct the CDR shown in Figure 2-4 in accordance with Appendix G of this document.

i. Implement EVM as documented in the project plan.

j. For contracts requiring EVM, conduct required IBRs.

k. Develop the preliminary training plan and training materials.

l. If the latest development cost Estimate at Completion (EAC) of the project or a schedule milestone listed on the project life-cycle chart in Figure 2-4 varies from the integrated baseline more than agreed upon thresholds, provide immediate written notice and a recovery plan to the program manager. These thresholds are documented in Section 3.1 of the project plan.

m. Use continuous risk management principles to manage IT risks in accordance with NPR 8000.4.

n. Update the project plan that follows the template in Appendix F.

o. Baseline work agreements for Phase D.

p. Develop the gate products required for KDP-D as indicated in Table 6-2.

q. Plan, prepare for, and support the project Governing Body review prior to KDP-D.

## 4.7 IT Projects – Phase D

4.7.1 Purpose: During Phase D, the project performs system coding, assembly, integration, and test.

4.7.2 Requirements: During Phase D, the project manager and the project team shall:

a. Implement the project plan.

b. Prepare baseline test plans, test procedures, and test cases.

c. Initiate coding, system assembly, integration, and test.

d. Resolve all test, analysis, and inspection discrepancies.

e. Document and implement all technical, management, and operational security controls as required by NPR 2810.1.

f. Prepare "as-built" and "as-deployed" hardware and software documentation.

g. Update the project plan that follows the template in Appendix F, including finalizing the IT security plan.

h. Complete all operational support and other enabling developments (e.g., facilities, equipment, updated databases), including a baseline operations handbook and a plan to transition system operations to the operations team.

i. Develop the baseline training plan and training materials.

j. Conduct operational tests and training, including normal and anomalous scenarios.

k. Submit any changes to the system description for inclusion in the NASA EA.

l. Meet the IT security certification and accreditation requirements specified in NPR 2810.1.

m. Plan, prepare for, and conduct the TRR and ORR shown in Figure 2-4 in accordance with Appendix G of this document.

n. Establish and maintain an integrated logistics support capability, including spares and system maintenance and operating procedures.

o. Implement EVM as documented in the project plan.

p. For contracts requiring EVM, conduct required IBRs.

q. If the latest development cost EAC of the project or a schedule milestone listed on the project life-cycle chart in Figure 2-4 varies from the integrated baseline more than agreed upon thresholds, provide immediate written notice and a recovery plan to the program manager. These thresholds are documented in Section 3.1 of the project plan.

r. Use continuous risk management principles to manage IT risks in accordance with NPR 8000.4.

s. Baseline work agreements for the Phase E.

t. Develop the gate products required for KDP-E as indicated in Table 6-2.

u. Plan, prepare for, and support the project Governing Body review prior to KDP-E.

## 4.8 IT Projects – Phase E

4.8.1 Purpose: During Phase E, the project deploys and operates the system developed in previous phases. During this phase, the project team that developed the system typically turns over responsibility for operation of the system to an operations team.

4.8.2 Requirements: During Phase E, the project manager, the project team, and/or the operations team shall:

a. Implement the project plan.

b. Deploy and operate the system.

c. Monitor system incidents, problems, and anomalies, as well as system capacity, to ensure that deployed project systems function as intended, investigate system behavior that is observed to exceed established operational boundaries or expected trends, and implement corrective actions as necessary.

d. Continuously monitor the system to ensure IT security controls are working properly and to detect and deter attempts to breach controls.

e. Update the training plan and training materials.

f. Provide sustaining engineering as necessary to enhance efficiency, reduce costs, repair software problems, increase capacity, and take advantage of the benefits of new technology.

g. Document lessons learned.

h. Conduct an annual IT security assessment of the system in conformance to the requirements of NPR 2810.1.

i. Re-certify the system every three years following the NIST standards for IT security certification as required by NPR 2810.1.

j. Update the “As-Is” and the “To-Be” information for this system in the NASA EA annually, as necessary.

k. Track the risks and mitigations identified in pre-Phase A and as updated in later phases.

l. Plan, prepare for, and support the EASR as shown in Figure 2-4 in accordance with the requirements of NPR 2830.1.

m. Prepare and document the system decommissioning/disposal requirements and plans in accordance with NPR 4300.1, NASA Personal Property Disposal Procedural Requirements, and the official records associated with the project in accordance with NPR 1441.1.

n. Use continuous risk management principles to manage IT risks in accordance with NPR 8000.4.

o. Baseline work agreements for Phase F.

p. Plan, prepare for, and conduct the PCR, including the project completion report, as shown in Figure 2-4 in accordance with Appendix G of this document.

q. Develop the gate products required for KDP-F as indicated in Table 6-2.

r. Plan, prepare for, and support the project Governing Body review prior to KDP-F.

## 4.9 IT Projects – Phase F

4.9.1 Purpose: During Phase F, the project implements the system decommissioning/ disposal plan.

4.9.2 Requirements: During Phase F, the project manager and the project team shall:

a. Plan, prepare for, and conduct the DR shown in Figure 2-4 in accordance with Appendix G of this document.

b. Safely and in accordance with applicable laws and regulations, dispose of project system assets.

c. Disposition all records and information only in accordance with the applicable records retention schedule items from NPR 1441.1.

# CHAPTER 5. Other Mission Support Investment (OMSI) Program and Project Requirements by Phase

## 5.1 OMSI Programs - Formulation Phase

5.1.1 Purpose: The purpose of program formulation activities is to establish a cost-effective program that meets Agency and Mission Directorate/Mission Support Office goals and objectives. The program FAD authorizes a program manager to initiate the planning of a new program and to perform the analyses required to formulate a program plan. Major reviews leading to approval at KDP-I are the PCDR, and the program Governing Body review.

5.1.2 Requirements: During program formulation, the program manager and the program team shall:

a. Support the Mission Directorate or Mission Support Office in developing and obtaining approval of the FAD, PCA, and the PPBE process.

b. Prepare and obtain approval of the program plan that follows the template in Appendix E.

c. Obtain approval of interagency and international agreements, as needed.

d. Plan, prepare for, and conduct a PCDR.

e. Develop all required KDP-I gate products as indicated in Table 6-1.

f. Plan, prepare for, and support the program Governing Body review prior to KDP-I.

## 5.2 OMSI Programs - Implementation Phase

5.2.1 Purpose: During implementation, the program manager works with the stakeholders and the constituent projects to execute the program plan in a cost-effective manner. PIRs and periodic independent assessments ensure that the program continues to contribute to Agency and Mission Directorate or Mission Support Office goals and objectives within funding constraints.

5.2.2 Requirements: During program implementation, the program manager and the program team shall:

a. Execute the program plan.

b. Conduct planning, program-level systems engineering, and integration, as appropriate to the program.

c. Support the Mission Directorate or Mission Support Office in initiating the projects selection process.

d. Support the MDAA or Mission Support Office Official-in-Charge in the selection of projects, either assigned or through a competitive process.

e. Approve project FADs and project plans.

f. Plan, prepare for, and conduct biennial PIRs.

g. Support Program Governing Body reviews prior to KDP-II, -III, -IV, etc.

h. Support the MDAA or Mission Support Office Official-in-Charge in updating the PCA.

i. Update the program plan.

j. Provide oversight of the projects within the program and report their status periodically.

k. Review project PPBE process inputs and prepare program process input.

l. Develop technologies and common solutions that cut across multiple projects within the program.

m. Develop all required gate products as indicated in Table 6-1 prior to KDP-II, -III, -IV, etc.

n. Plan, prepare for, and support the program Governing Body reviews prior to KDP-II, -III, -IV, etc.

### 5.3 OMSI Projects – Pre-Phase A

5.3.1 Purpose: During Pre-Phase A, a pre-project team studies a broad range of project concepts that contribute to program and Mission Directorate or Mission Support Office goals and objectives. These advanced studies along with interactions with customers and other potential stakeholders help identify a promising project-enabling concept and tentative project-level requirements. The team also identifies potential technology needs and assesses the gaps between such needs and current technology plans. These activities are focused toward a SCR and KDP-A. Pre-Phase A for OMSI projects is optional.

5.3.2 Requirements: If a Pre-Phase A is conducted, then the pre-project manager and team shall:

a. Obtain an approved project FAD.

b. Support the program manager in the development of the preliminary program requirements on the project.

c. Develop a preliminary system/project concept.

d. Develop a risk list and mitigation concepts.

e. Plan, prepare for, and conduct the SCR.

f. Baseline work agreements for Phase A.

g. Prepare all required KDP-A gate products indicated in Table 6-2.

h. Plan, prepare for, and support the project Governing Body review prior to KDP-A.

## 5.4 OMSI Projects – Phase A

5.4.1 Purpose: During Phase A, a project team is formed to fully develop a project concept and begin development of needed technologies. This work, along with interactions with customers and other potential stakeholders, helps finalize a project concept and the project-level requirements. These activities are focused toward System/Project Requirements Review. The phase culminates in KDP-B. Phase A activities for OMSI projects of small scale or scope may be combined with Phase B activities with the approval of the program manager.

5.4.2 Requirements: During Phase A, the project manager and project team shall:

a. Obtain an approved project FAD, if a pre-Phase A was not conducted.

b. Support the program manager in the development of the baseline program requirements on the project.

c. Establish the project structure and controls.

d. Initiate the development of MOUs/MOAs with domestic external partners, as needed.

e. Work with the program manager and HQ Office of External Relations to initiate international agreements, as needed.

f. Prepare a preliminary project plan that follows the template in Appendix F.

g. Complete an AoA and select a preferred baseline system/project concept.

h. Develop a preliminary system/project operations concept.

i. Develop preliminary project requirements.

j. Working with the appropriate support organizations, develop an initial IT infrastructure assessment of project needs and Agency-wide and external capabilities to meet infrastructure needs.

k. Plan, prepare for, and conduct the SRR.

l. Finalize work agreements for Phase B.

m. Develop all required KDP-B gate products indicated in Table 6-2.

n. Plan, prepare for, and support the project Governing Body review prior to KDP-B.

## 5.5 OMSI Projects – Phase B

5.5.1 Purpose: During Phase B, the project team completes its preliminary design and technology development. These activities are focused toward completing the project plan and PDR. In addition, the NAR process is invoked prior to the project Governing Body review. The phase culminates in KDP-C.

5.5.2 Requirements: During Phase B, the project manager and the project team shall:

a. Support the program manager in the update of the baseline program requirements on the project.

b. Finalize external agreements, such as interagency and international agreements, procurements, MOUs, and facility resources.

c. Implement the preliminary project plan.

d. Finalize a project control tool set that includes a WBS and cost, schedule, and periodic status reporting processes and mechanisms.

e. Baseline project requirements.

f. Develop the project preliminary technical architecture.

g. Develop the project preliminary designs.

h. Develop the baseline operations concept.

i. Plan, prepare for, and conduct the PDR.

j. Identify any risk drivers and proposed mitigation plans for each risk.

k. Complete and obtain approval of the baseline project plan that follows the template in Appendix F.

l. Plan, prepare for, and support the NAR independent review team.

m. Baseline work agreements for Phase C.

n. Develop the gate products required for KDP-C indicated in Table 6-2.

o. Plan, prepare for, and support project Governing Body review prior to KDP-C.

## 5.6 OMSI Projects – Phase C

5.6.1 Purpose: During Phase C, the project completes the design that meets the detailed requirements, begins early production of project components requiring long-lead time, and makes acquisitions that may be required.

5.6.2 Requirements: During Phase C, the project manager and the project team shall:

a. Implement the baseline project plan.

b. Baseline the project technical architecture.

c. Develop and test all requisite prototypes.

d. Initiate all operational support and other enabling developments (e.g., facilities, equipment), including a preliminary operations handbook to support the operations team.

e. Develop/procure long lead-time project components.

f. Develop the preliminary training plan and training materials.

g. Plan, prepare for, and conduct the CDR.

h. Update the project plan that follows the template in Appendix F.

i. Baseline work agreements for Phase D.

j. Develop the gate products required for KDP-D as indicated in Table 6-2.

k. Plan, prepare for, and support the project Governing Body review prior to KDP-D.

## 5.7 OMSI Projects – Phase D

5.7.1 Purpose: During Phase D, the project performs project component assembly, integration, and test.

5.7.2 Requirements: During Phase D, the project manager and the project team shall:

a. Implement the project plan.

b. Prepare baseline test plans, test procedures, and test cases.

c. Initiate project component build, assembly, integration, and test.

d. Resolve all integration and test discrepancies.

e. Update the project plan that follows the template in Appendix F.

f. Prepare "as-built" or "as-deployed" documentation.

g. Develop the baseline training plan and materials.

h. Complete all operational support and other enabling developments (e.g., facilities, equipment, updated databases), including a baseline operations handbook.

i. Conduct operational tests and training.

j. Plan, prepare for, and conduct the ORR.

k. Baseline work agreements for Phase E.

l. Develop the gate products required for KDP-E as indicated in Table 6-2.

m. Plan, prepare for, and support the project Governing Body review prior to KDP-E.

## 5.8 OMSI Projects – Phase E

5.8.1 Purpose: During Phase E, the project implements the operations plan developed in previous phases.

5.8.2 Requirements: During Phase E, the project manager and the project team shall:

a. Implement the project plan.

b. Deploy and execute the project.

c. Update the training plan and training materials.

d. Document lessons learned.

e. Prepare and document systems decommissioning/disposal requirements and plans.

f. Baseline work agreements for Phase F.

g. Develop the gate products required for KDP-F as indicated in Table 6-2.

h. Plan, prepare for, and support the project Governing Body review prior to KDP-F.

## 5.9 OMSI Projects – Phase F

5.9.1 Purpose: During Phase F, the project implements the project decommissioning plan.

5.9.2 Requirements: During Phase F, the project manager and the project team shall:

a. Plan, prepare for, and conduct the DR.

b. Safely and in accordance with all laws and regulations, dispose of project assets.

## CHAPTER 6. Required Gate Products at Key Decision Points

### 6.1 Gate Products

6.1.1 There are defined program and project management products (and their maturities) expected to be completed before each KDP. These products include documented project plans, design information, technical analyses, project metrics, and documentation of independent assessments. Program and project managers assemble this information in an orderly manner for presentation and discussion at the reviews prior to the KDPs. Table 6-1 lists the gate products required for programs and describes their required maturity by KDP and major program review. Table 6-2 lists the gate products required for IT and OMSI projects and describes their required maturity by KDP and major project review. Products marked as "Updated" must be analyzed by the program or project, and any required changes made prior to the KDP. The date markings of the documents and their revision histories must be changed to indicate that the analysis occurred, even if changes to the content of the documents were not needed.

| **NPR 7120.7 Program Gate Products** | | | | |
|---|---|---|---|---|
| **Products** | **Formulation** | **Implementation** | | |
| | **KDP I** | **KDP II** | **KDP III** | **KDP n** |
| FAD | Approved | | | |
| PCA | Approved | Updated | Updated | Updated |
| Program Plan | Approved | Updated | Updated | Updated |
| Interagency and International Agreements | Approved | | | |
| PCDR Products | Final | | | |
| PIR Products | | Final | Final | Final |

Table 6-1 Program Gate Products Maturity Matrix

### 6.2 Waiver Approval Authority

6.2.1 Waivers to requirements in this NPR may be granted by the officials shown in Tables 6-3, 6-4, and 6.5. Waivers are used to adapt the requirements to the scope and scale of Information Technology and Institutional Infrastructure programs and projects.

6.2.2 Waivers with dissent are reviewed and dispositioned by the NASA Deputy Administrator for programs and projects with a life-cycle cost equal to or greater than 10 million dollars and by the OCE, cognizant MDAA or Mission Support Office Official-in-Charge for all other programs and projects, depending on the life-cycle cost.

| NPR 7120.7 Project Gate Products | | | | | | | |
|---|---|---|---|---|---|---|---|
| Products | Pre-Phase A | Phase A | Phase B | Phase C | Phase D | Phase E | Phase F |
| | KDP A | KDP B | KDP C | KDP D | KDP E | KDP F | |
| | SCR | SRR | PDR | CDR | TRR/ ORR | PCR | |
| **Project Planning, Cost, Schedule, and Communication Products** | | | | | | | |
| 1. FAD (including decision memorandum) | Approved | Approved (if there was no Pre-Phase A) | | | | | |
| 2. Program Requirements on the Project | Preliminary | Baseline | Updated | | | | |
| 3. Work Agreements for next phase | Baseline | Baseline | Baseline | Baseline | Baseline | Baseline | |
| 4. Integrated Baseline | | Preliminary | Baseline | | | | |
| 5. Governing Body Review products | Final | Final | Final | Final | Final | Final | |
| 6. Software Development/Management Plan as required by NPR 7150.2, NASA Software Engineering Requirements (IT Projects only) | | Preliminary | Final | | | | |
| 7. Project Plan (refer to Chapter 4; Appendix F provides a template; individual sub-plans can be stand-alone documents) | | Preliminary | Baseline | Updated | Updated | | |
| 8. Decision Memorandum | Baseline | Update | Update | Update | Update | Update | Update |
| **Project Technical Products** | | | | | | | |
| 1. System Concept | Preliminary | Baseline | | | | | |
| 2.Information/System Security Categorization (IT Projects Only) | Preliminary | Baseline | | | | | |
| 3. System Level Requirements | | Preliminary | Baseline | | | | |
| 4. System Technical Architecture | | | Preliminary | Baseline | | | |
| 5. Operations Concept | | Preliminary | Baseline | | | | |
| 6. Preliminary Design | | | Baseline | | | | |
| 7. Detailed Design | | | | Baseline | | | |
| 8. Test Plan, Test Procedures, and Test Cases | | | | | Baseline | | |
| 9. Training Plan and Training Materials | | | | Preliminary | Baseline | Updated | |
| 10. As-built and As-deployed Hardware and Software Documentation | | | | | Baseline | | |
| 11. Operations Handbook | | | | Preliminary | Baseline | | |
| 12. Project Completion Report | | | | | | Final | |
| 13. Decommissioning Plan | | | | | | | Final |

Table 6-2 Project Gate Products Maturity Matrix

| IT Project Certification Products (IT Projects Only) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Products | Pre-Phase A | Phase A | Phase B | Phase C | Phase D | Phase E | Phase F |
| | KDP A | KDP B | KDP C | KDP D | KDP E | KDP F | |
| 1. Certification that project is ready to transition to the next phase | Final | Final | Final | Final | Final | Final | |
| 2. IT Security Certification and Accreditation of System | | | | | Initial | Triennial renewal | |

Table 6-2 Project Gate Products Maturity Matrix (continued)
Note: The products shown in Table 6-2 are a minimal set. Depending on the nature of the project, other products (e.g., a Disaster Recovery Plan) called out in other policy documents may be required.

6.2.3 Requests for waivers to requirements in this NPR are documented and submitted for approval using the NPR 7120.7 Waiver Form. Prior to the KPD I for programs and KDP B and KDP C for projects, these requests may be documented and attached to a single waiver to assure proper routing and control. Waivers impacting formulation or requiring long lead time may be submitted individually early in formulation. Following KDP I for programs and KDP C for projects, waivers must be submitted individually to the appropriate authorities.

| Project Type | Project Manager | Program Manager | MDAA or Mission Support Office Official-in-Charge | CIO | OCE & OSMA | Approval Authority for Waivers with Dissent |
|---|---|---|---|---|---|---|
| IT | R | A | A | A | A | NASA Deputy Administrator |
| OMSI | R | A | A | | A | NASA Deputy Administrator |

R = Recommends A = Approves I = Informed
Table 6-3 Waiver Approval for Programs and Projects ≥ $10 million Life-Cycle Cost (LCC)

| Project Type | Project Manager | Program Manager | MDAA or Mission Support Office Official-in-Charge | CIO | OCE & OSMA | Approval Authority for Waivers with Dissent |
|---|---|---|---|---|---|---|
| IT | R | A | A | A | I | OCE |
| OMSI | R | A | A | | A* | OCE |

R = Recommends A = Approves I = Informed
*If the project is implemented at a Center, Center level SMA Approval is required.

Table 6-4 Waiver Approval for Programs and Projects ≥ $1 million but <$10M LCC

| Project Type | Project Manager | Program Manager | MDAA or Mission Support Office Official-in-Charge | CIO | OCE & OSMA | Approval Authority for Waivers with Dissent |
|---|---|---|---|---|---|---|
| IT | R | A | I | I | | MDAA or Mission Support Office Official-in-Charge |
| OMSI | R | A | I | | A* | MDAA or Mission Support Office Official-in-Charge |

R = Recommends A = Approves I = Informed
*If the project is implemented at a Center, Center level SMA Approval is required.
Table 6-5 Waiver Approval for Programs and Projects < $1 million LCC

6.2.4 Waivers to requirements in NPRs referenced in this NPR may be granted according to the process established by the NPR's Responsible Office.

NPR 7120.7 Waiver Form

| | | |
|---|---|---|
| Name of Program or Project Requesting Waiver: | Date of Request: | Date Waiver is Needed: |
| Name and Organization of Initiator : | Requirement to be Waived: | |
| Project Deliverable Affected: | Waiver To:<br>☐ Policy ☐ Procedure ☐ Requirement ☐ Other<br>☐ Additional information is attached | |
| Original Requirement of Document to be Waived (list Appropriate Sections or Text): | | |
| Waiver Requested: | | |
| Reason/Justification (Attach additional information, if necessary): | | |
| Risk Assessment of the Program and Project if Waiver is Approved: | | |

| Required Signatures | Signature | Date | Approved (Yes/No) |
|---|---|---|---|
| Project Manager | | | |
| Program Manager | | | |
| Mission Directorate AA or Mission Support Office Official-in-Charge (if needed) | | | |
| NASA Chief Information Officer (if needed) | | | |
| NASA Chief Engineer (if needed) | | | |
| Safety and Mission Assurance | | | |
| NASA Deputy Administrator (if needed) | | | |

## APPENDIX A. Definitions

**Acceptable Risk**. The risk that is understood and agreed to by the program/project, program/project Governing Body, Mission Directorate and/or Mission Support Office, and other customer(s) sufficient to achieve the defined success criteria within the approved level of resources.

**Activity**. An operation that sustains NASA as an organization. Unlike projects, which are temporary and unique, activities are ongoing and repetitive.

**Acquisition.** The acquiring, by contract, of supplies or services (including construction) through purchase or lease, whether the supplies or services are already in existence or must be created, developed, demonstrated, or evaluated. Acquisition begins at the point when Agency needs are established and includes the description of requirements to satisfy Agency needs, solicitation, and selection of sources, award of contracts, contract financing, performance, administration, technical, and management functions directly related to the process of fulfilling Agency needs by contract.

**Actual Cost of Work Performed (ACWP):** or Actual Costs (AC). The data should be consistent with reports generated by the EVMS. The costs actually incurred and recorded in accomplishing the work performed within a given time period. ACWP reflects the applied costs.

**Agency Program Management Council (Agency PMC).** The senior management group, chaired by the Associate Administrator or designee, responsible for reviewing program formulation performance, recommending approval of proposed programs, and overseeing implementation of designated programs and projects according to Agency commitments, priorities, and policies.

**Analysis of Alternatives (AoA).** A formal analysis method that compares alternatives by estimating their ability to satisfy mission requirements through an effectiveness analysis and by estimating their life-cycle costs (LCC) through a cost analysis. The results of these two analyses are used together to produce a cost-effectiveness comparison that allows decision makers to assess cost and effectiveness simultaneously. An AoA broadly examines multiple elements of program/project alternatives (including technical performance, risk, LCC, and programmatic aspects), and is typically an important part of formulation studies. The terms, trade studies, trades, and tradeoff analyses, are often used in lieu of AoA, when the scope of the analysis is more limited.

**Approval.** The acknowledgement by the responsible official that the program/project has met expectations and formulation requirements and is ready to proceed to implementation.

**As Of Date:** Date when all data was measured. Metrics would be current 'as of' the date entered.

**Budget at Completion (BAC):** The data should be consistent with reports generated by the EVMS. The sum of all performance budgets established for the contract.

**Budget Cost of Work Scheduled (BCWS):** or Planned Value (PV). The data should be consistent with reports generated by the EVMS. The sum of the performance budgets for all work scheduled to be accomplished with a given time period. This includes detailed work packages, planning packages, and LOE packages.

**Budgeted Cost of Work Performed (BCWP):** or Earned Value (EV). The data should be consistent with reports generated by the EVMS. The value of completed work expressed as the value of the performance budget assigned to that work. This is equal to the sum of the budgets for completed work packages, completed portions of open work packages, apportioned effort earned on the base accounts, and the value of LOE activities.

**Certification.** A confirmation in formal documentation that an accepted standard has been met.

**Component Facilities.** Complexes that are geographically separated from the NASA Center or institution to which they are assigned.

**Concurrence.** The individual(s) reviewing and providing agreement within their span of responsibility of a document, product, or service that has yet to be approved.

**Contract.** A mutually binding legal relationship obligating the seller to furnish the supplies or services (including construction) and the buyer to pay for them. In addition to bilateral instruments, contracts include, but are not limited to: awards and notices of awards; job orders or task letters initiated 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.

**Cost Variance (CV):** The difference between earned value and actual cost (cost variance = BCWP - ACWP.) A positive value indicates a favorable condition and a negative value indicates an unfavorable condition.

**Cost Performance Index (CPI):** BCWP divided by ACWP.

**Customer.** Any individual, organization, or other entity to which a program or project provides a product(s) and/or service(s).

**Decision Authority**. The individual responsible for evaluating IA and program and project Governing Body recommendations, assessing program and project deliverables,

and making the decision at a KDP that authorizes a program or project to transition to the next life-cycle phase.

**Development Cost** - Includes all project costs from authorization to proceed to Implementation through operational readiness at the end of Phase D.

**Earned Value Management (EVM).** A tool 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, enabling management to gain insight to 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 (i.e., risky WBS elements).

**Enterprise Architecture (EA).** An explicit description and documentation of the current and desired relationships among business and management processes and information technology. An EA includes principles, an architecture framework, a technical standards profile, current and target architectures, and a transition strategy to move from the current to target architecture.

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

**Environmental Management.** The activity of ensuring that program and project actions and decisions which potentially impact or damage the environment are assessed/evaluated during the formulation/planning phase and reevaluated throughout implementation and performed according to all NASA policy and Federal, state, and local environmental laws and regulations.

**Estimate at Completion.** The sum of project actual costs to date, estimated to complete (ETC), and reserves. Contractor financial information is included in the project Estimate at Completion.

**Evaluation.** The continual, independent (i.e., outside the advocacy chain of the program/project) evaluation of the performance of a program or project, and incorporation of the evaluation findings to ensure adequacy of planning and execution according to plan.

**Federal IT Dashboard.** A website enabling federal agencies, industry, the general public and other stakeholders to view details of federal information technology investments. The purpose of the Dashboard is to provide information on the effectiveness of government IT programs and to support decisions regarding the investment and management of resources. The Dashboard is now being used by the Administration and Congress to make budget and policy decisions.

**Federal Procurement Data System (FPDS) Contract Identifier**: contract number reported in the Exhibit 300 supporting the Major Investment

**Formulation.** 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 identification of how the program or project supports the Agency's strategic needs, goals, and objectives.

**Formulation Authorization Document (FAD).** The document issued by the MDAA or Mission Support Office Official-in-Charge to authorize the level of formulation of a program whose goals will fulfill part of the Agency's Strategic Plan, Mission Directorate Strategies, or Mission Support Office Functional Leadership Plans. In addition, a FAD or equivalent is used to authorize the level of formulation of a project.

**Governing Body.** The council, committee, or other Agency body that has responsibility for the oversight of programs and projects, conducting reviews before KDPs, and making recommendations to the program and project Decision Authority on the program or project readiness to transition to the next phase of the program or project life cycle. In many cases it is the OMC for IT and institutional infrastructure programs and projects.

**Highly Specialized Information Technology**. Highly specialized IT is a part of, internal to, or embedded in a Mission platform. The platform's function (e.g., avionics, guidance, navigation, flight controls, simulation, radar, etc.) is enabled by IT but not driven by IT itself (e.g., computer hardware and software to automate internal functions of a spacecraft or spacecraft support system such as spacecraft control and status, sensor signal and data processing, and operational tasking.) Highly specialized IT acquisitions may include full development (where the information technology is a primary issue) to modification of existing systems (information architecture is firm and demonstrated in an operational environment) where information technology is not an issue. Real time is often critical - and few opportunities exist to use Commercial Off The Shelf (COTS) or Government Off The Shelf (GOTS) beyond microprocessors and operating systems because these systems are largely unprecedented or largely unique applications. Certain IT are considered mission critical because the loss would cause the stoppage of mission operations supporting real-time on-orbit mission operations and are identified as "highly specialized" by the Directorate Associate Administrator. Highly specialized IT is largely custom, as opposed to COTS or commodity IT systems or applications, and includes coding/applications that are integral parts of the research or science requirements, e.g., Shuttle Avionics Upgrade. Common engineering IT tools such as Product Lifecycle Management (PLM) systems, Computer-Aided Design (CAD) systems, and collaborative engineering systems and environments are not highly specialized IT.

Representative examples of highly specialized IT include:

Avionics software, real-time control systems, onboard processors, Deep Space Network, spacecraft instrumentation software, wind tunnel control system, human physiology monitoring systems, ground support environment, experiment simulators, Mission Control Center, and launch cameras.

**Implementation.** The execution of approved plans for the development and operation of programs and projects, the establishment of control systems to ensure performance to plan, and alignment with current Agency strategies.

**Independent Assessment (IA).** The general term referring to an evaluation of a program or project conducted by experts outside the advocacy chain. Specifically, a review or evaluation that results in an assessment of the program's or project's readiness (technical, schedule, cost, risk) to proceed to the next phase in the life cycle that is reported to a program or project Governing Body and Decision Authority.

**Information Technology (IT).** Any equipment or interconnected system(s) or subsystem(s) of equipment that is used in the automatic acquisition, storage, analysis, evaluation, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by the Agency.

**Information Technology Authority.** The articulation of the role in the IT governance model of the Mission Directorates in relation to that of the Agency and Center CIOs and the checks and balances between them.

**Integrated Baseline.** The project's technical performance and content, technology application, schedule milestones, and budget. The integrated baseline includes the WBS, WBS Dictionary, integrated master schedule, preliminary life-cycle cost estimate, and workforce estimate, consistent with the program requirements on the project.

**Integrated Baseline Review (IBR).** An IBR is a review that includes total project (contracted as well as in-house NASA) efforts. It is conducted jointly with personnel responsible for the efforts. Specifically, an IBR verifies that the technical content of the performance measurement baseline is consistent with the contract scope, work breakdown structure, and actual budget and schedule; ensures that effort personnel have identified all risks and are aware of their responsibilities for their management; ensures that there is a logical sequence of effort planned consistent with the contract schedule; ensures the disciplined implementation of all project EVMS; establishes a forum through which the program/project manager and the technical staff gain a sense of ownership of the cost/schedule management process; and establishes the baseline for the life of the contract.

**Internal Use Software.** Software that is COTS, internally developed or contractor developed to meet NASA's internal needs, e.g., financial and administrative software, or communications software independent of a mission (space flight and associated ground support), with a projected life-cycle cost of $1,000,000 or more and a useful life of five years or more.

**Investment.** Resources, usually funding, along with a decision on how to apply those resources that results in a capability, product, or service that helps NASA achieve its Mission. Generally, the benefits of an investment exceeds the cost of the investment.

**Key Decision Point (KDP).** The event at a point in time in the program or project life cycle, usually at the end of a program or project life-cycle phase, when the program or project Decision Authority makes the decision (or not) to authorize the program or project to transition to its next life-cycle phase. Program KDPs are designated with Roman numerals, e.g., KDP II, and project KDPs are designated with letters, e.g., KDP B.

**Lessons Learned.** The significant knowledge or understanding gained through past or current programs and projects that is documented and collected to benefit current and future programs and projects.

**Life-Cycle Cost (LCC).** The total of the direct, indirect, recurring, nonrecurring, and other related expenses incurred, or estimated to be incurred, in the design, development, verification, production, operation, maintenance, support, and decommissioning of a project. LCC of a project or system can also be defined as the total cost of ownership over the project's or system's life cycle from formulation through implementation. It includes all design, development, deployment, operation and maintenance, and disposal costs.

**Life Cycle Cost Estimate.** Includes all costs including UFE, development cost, and initial operational support costs up to the point of the program or project becoming operational.

**Major IT Investment.** A system or acquisition requiring special management attention because of its importance to the mission or function of the agency, a component of the agency, or another organization; is for financial management and obligates more than $500, 000 annually; has significant program or policy implications; has high executive visibility; has high development, operating, or maintenance costs; is funded through other than direct appropriations; or is defined as major by the agency's capital planning and investment control process.

**Margin.** The difference between the resource allocation to a cost, schedule, or technical performance parameter and the current actual or expected value of the parameter.

**Metric.** A measurement taken over a period of time that communicates vital information about a process or activity. A metric should drive appropriate action.

**Mission Directorate**. A primary implementer of a NASA mission area. Each Mission Directorate is led by an Associate Administrator who leads their respective mission area. Listed in the order they appear on the NASA organizational chart, the current Mission

Directorates are as follows: Aeronautics, Human Exploration and Operations, and Science.

**Mission Support Office.** Headquarters organizations that establish and disseminate policy and leadership strategies within assigned areas of responsibility in support of all NASA programs and activities. Refer to NPD 1000.3, for the list of offices included in this designation. As used in this document, the term refers to any Headquarters non-Mission Directorate office that initiates a program or project.

**Non-Advocate Review (NAR).** The analysis of a proposed program or project by a (non-advocate) team composed of management, technical, and budget experts (personnel) from outside the advocacy chain of the proposed program or project. It provides Agency management with an independent assessment of the readiness of the program/project to proceed into implementation.

**OMB Exhibit 300.** Exhibit 300, also called the Business Case, is the mechanism by which the Office of Management and Budget (OMB) measures an agency's level of compliance with laws and mandated management practices in its investment portfolio of major Information Technology and capital asset investments. OMB uses the Exhibit 300 to make both quantitative decisions about budgetary resources consistent with the Administration's program priorities and qualitative assessments about whether the Agency's programming processes are consistent with OMB policy and guidance.

**Planned Start Date:** Start date defined by the performance measurement baseline. The date should be consistent with budget submissions and the Federal IT Dashboard.

**Planned End Date:** Ending date defined by the performance measurement baseline. The date should be consistent with budget submissions and the Federal IT Dashboard.

**Program.** A strategic investment by a Mission Directorate or Mission Support Office that has a defined architecture and/or technical approach, requirements, funding level, and a management structure that initiates and directs one or more projects. A program defines a strategic direction that the Agency has identified as critical.

**Program Commitment Agreement (PCA).** The contract between the Associate Administrator and the cognizant Mission Directorate or Mission Support Office for implementation of a program.

**Program Management Council (PMC).** One of the hierarchy of forums composed of senior management that assesses program or project planning and implementation, and provides oversight and direction as appropriate. These are established at the Agency or Mission Directorate levels.

**Program Plan.** The document that establishes the baseline for implementation, signed by the MDAA or Mission Support Office Official-in-Charge, Center Director(s) (if appropriate), 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.

**Project.** A specific investment having defined requirements, a life-cycle cost, a beginning, and an end. A project yields new or revised products that directly address NASA's strategic needs.

**Project Plan.** The document that establishes the baseline for implementation, signed by the cognizant program manager, Center Director (if appropriate), and project manager.

**Project Success Criteria.** Standards against which the program or project will be deemed a success. Project success criteria may be both qualitative and quantitative, and may cover mission cost, schedule, and performance results, as well as actual mission outcomes.

**Quality Assurance.** A planned and systematic set of actions necessary to provide confidence that the products or services conform to documented requirements.

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

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

**Reserves.** Resources (funding, schedule, performance, manpower, and services) held back by a project manager, which can be allocated for expansion, unforeseen events, or other project adjustments when they occur.

**Risk.** The combination of the probability that a program or project will experience an undesired event (some examples include a cost overrun, schedule slippage, malicious activities, environmental impact, failure to achieve a needed technological breakthrough or project success criteria) and the consequences, impact, or severity of the undesired event, were it to occur. Both the probability and consequences may have associated uncertainties.

**Risk Assessment.** An evaluation of a risk item that determines (1) what can go wrong, (2) how likely is it to occur, and (3) what the consequences are.

**Risk Management.** An organized, systematic decision-making process that efficiently identifies, analyzes, plans, tracks, controls, communicates, and documents risk to increase the likelihood of achieving program/project goals.

**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.

**Schedule Variance (SV):** The difference between earned value and the budget (schedule

variance = BCWP – BCWS). A positive value is a favorable condition while a negative value is unfavorable.

**Schedule Performance Index (SPI):** BCWP divided by BCWS.

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

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

**Success Criteria.** That portion of the top-level requirements that define what will be achieved to successfully satisfy the Strategic Plan objectives addressed by the program, project, or technology demonstration.

**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.** A disciplined approach for the definition, implementation, integration, and operation of a system (product or service). The emphasis is on achieving stakeholder functional, physical, and operational performance requirements in the intended use environments over its planned life within cost and schedule constraints. Systems engineering includes the engineering processes and technical management processes that consider the interface relationships across all elements of the system, other systems, or as a part of a larger system.

**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. Exceeding the parameters or levels specified in controlling documents will result in consideration of a termination review.

**Unallocated Future Expenses.** The portion of estimated cost required to meet specified confidence level that cannot yet be allocated to the specific project WBS subelements because the estimate includes probabilistic risks and specific needs that are not known until these risks are realized.

**Unique Project Identifier (UPI):** Unique Investment Identifier as reported in the Exhibit 300 and 53.

**Validation.** Proof that the product accomplishes the intended purpose. May be determined by a combination of test, analysis, and demonstration.

**Verification.** Proof of compliance with specifications. May be determined by a combination of test, analysis, demonstration, and inspection.

**Waiver.** A written authorization granting relief from a requirement that results in more risk than is inherent in the original requirement. Waivers grant permanent or temporary relief after the original requirement is baselined for the specific product or process.

**Work Agreement.** A formal agreement between the program/project and its supporting organizations, prepared for each program/project cost account and used to document agreements and commitments for the work to be performed, including scope of work, receivables/deliverables, schedule, budget, and assumptions.

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

## APPENDIX B. Acronyms

| | |
|---|---|
| AoA | Analysis of Alternatives |
| BAC | Budget at Completion |
| BCWS | Budget Cost of Work Scheduled |
| BCWP | Budgeted Cost of Work Performed |
| CCB | Configuration Control Board |
| CDR | Critical Design Review |
| CIO | Chief Information Officer |
| CoF | Construction of Facilities |
| COOP | Continuity of Operations Planning |
| CV | Cost Variance |
| CPI | Cost Performance Index |
| DA | Decision Authority |
| DR | Decommissioning Review |
| DME | Development, Modification, or Enhancement |
| EA | Enterprise Architecture |
| EAPR | Enterprise Architecture Project Review |
| EAC | Estimate at Completion |
| EASR | Enterprise Architecture Service Review |
| ECR | Environmental Compliance and Restoration |
| EVM | Earned Value Management |
| EVMS | Earned Value Management System |

| | |
|---|---|
| FAD | Formulation Authorization Document |
| FAR | Federal Acquisition Regulation |
| FPDS | Federal Procurement Data System (Contract Identifier) |
| GFY | Government Fiscal Year |
| IA | Independent Assessment |
| IBR | Integrated Baseline Review |
| IRM | Information Resource Management |
| IT | Information Technology |
| ITMB | Information Technology Management Board |
| IT PMB | Information Technology Program Management Board |
| IVR | Independent Validation for Reasonableness |
| KDP | Key Decision Point |
| LCC | Life-Cycle Cost |
| MDAA | Mission Directorate Associate Administrator |
| MdM | Metadata Manager |
| MOA | Memorandum of Agreement |
| MOU | Memorandum of Understanding |
| NAR | Non-Advocate Review |
| NFS | NASA Federal Acquisition Regulation (FAR) Supplement |
| NOA | New Obligational Authority |
| NPD | NASA Policy Directive |
| NPR | NASA Procedural Requirements |
| OCE | Office of Chief Engineer |

| | |
|---|---|
| OMC | Operations Management Council |
| OMSI | Other Mission Support Investments |
| O&M | Operations and Maintenance |
| ORR | Operational Readiness Review |
| PAR | Program Approval Review |
| PCA | Program Commitment Agreement |
| PCDR | Program Concept and Definition Review |
| PCR | Project Completion Review |
| PDR | Preliminary Design Review |
| PIR | Program Implementation Review |
| PMB | Program Management Board |
| PMC | Program Management Council |
| PPBE | Planning, Programming, Budgeting, and Execution |
| RFA | Request for Action |
| RFP | Request for Proposal |
| SCR | System Concept Review |
| SRR | System Requirements Review |
| SPI | Schedule Performance Index |
| SV | Schedule Variance |
| TRR | Test Readiness Review |
| UFE | Unallocated Future Expenses |
| UPI | Unique Project Identifier |
| V&V | Verification and Validation |

| | |
|---|---|
| WBS | Work-Breakdown Structure |

## APPENDIX C. Formulation Authorization Document Template

### C.1 Program FAD Title Page

**Program**
**Formulation Authorization Document**

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

_____ _____
Mission Directorate or Mission Support Office Official Date

Figure C-1 Program Formulation Title Page

## C.2 Project FAD Title Page

**Project**
**Formulation Authorization Document**

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

| | |
|---|---|
| _____ | _____ |
| Mission Directorate or Mission Support Office Official | Date |
| _____ | _____ |
| Program Manager | Date |

Figure C-2 Project Formulation Authorization Document Title Page

## C.3. Program/Project FAD Template

**PROGRAM/PROJECT**
**FORMULATION AUTHORIZATION DOCUMENT**
**(PROGRAM/PROJECT TITLE)**

### 1.0 PURPOSE

Describe the purpose of the program/project. Identify the program/project goals and objectives to be met.

### 2.0 AUTHORITY

Describe the NASA organizational structure for managing the formulation process from the Mission Directorate or Mission Support Office to the NASA Center program/project managers, as applicable. Include lines of authority, coordination, and reporting.

### 3.0 PROGRAM PROJECT GOALS AND OBJECTIVES

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

### 4.0 INTERNAL PARTICIPANTS

Identify Mission Directorates, Mission Support Offices, Centers, and other NASA organizations to be involved in the activity, their scope of work, and any known constraints related to their efforts (e.g., program/project funding interdependencies).

### 5.0 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 must be cofunded by the external participant).

### 6.0 INFORMATION TYPES

In conformance with NPR 2810.1, Security of Information Technology, identify the FIPS 199 information that IT investments and systems will be processing and handling.

### 7.0 FUNDING

Identify, by fiscal year, the funding that will be committed for formulation.

### 8.0 REVIEWS

Describe the reviews, including independent reviews according to the Reviews Table in Chapter 2, required during the formulation phase. Describe the criteria for triggering a termination review.

## 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 or Mission Support Office Official Date

_____ _____

Associate or Deputy Administrator Date

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 or Mission Support Office requirements. 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 governed by the program.

### 3.0 PROGRAM AUTHORITY

Describe the NASA organizational structure for managing the program and projects from the Mission Directorate or Mission Support Office to the NASA Centers, other internal organizations, and project managers. Include lines of authority and reporting, organizational responsibilities, the Governing Body (e.g., OMC) for the oversight of the program and its projects, and the approving official for new projects.

### 4.0 TECHNICAL PERFORMANCE COMMITMENT

Summarize the performance metrics with goal and minimum thresholds needed to achieve the program objectives. If the objectives include a technical performance target (goal) in addition to a threshold requirement, the commitment could be stated as a range.

### 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 NAR.
3. Start of Implementation.
4. End of Implementation.
5. Other milestones or time periods, as appropriate for the specific program.

### 6.0 COST COMMITMENT

Provide the maximum estimated cost for the program. This will incorporate programmatic constraints and can be demonstrated by including a table of all projects in Formulation and Implementation for the current year and nine-year horizon. (The actual cost plan is developed during the annual PPBE process.) The cost commitment includes but is not limited to, standard project activities, facilities costs, deployment, sustaining operations maintenance, data analysis, and decommissioning.

## 7.0 ACQUISITION STRATEGY

Provide a brief statement of the proposed acquisition strategy for major program elements.

## 8.0 HIGH-RISK AREAS

Identify the areas of highest risk for the program (covering safety, technical, institutional, cost, or schedule issues) in which failure may result in changes to the program baseline cost, schedule, 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.

## 9.0 INTERNAL AGREEMENTS

If the program is dependent on other NASA activities outside the Mission Directorate or Mission Support Office'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 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.

## 11.0 INDEPENDENT ASSESSMENTS

Specify the type of independent assessments that will be performed during the program life cycle.

## 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

Identify waivers that will be sought for the program. Provide 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 deviations to the original PCA. This log includes the information shown in Figure D-2 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.

| Date | Event | Change | Addendum | Cancellation Review Req'd | Mission Directorate or Mission Support Office Official Signature | Associate or Deputy Administrator 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 | | |

Figure D-2 Sample Program Commitment Agreement Activities Log

## APPENDIX E. Program Plan Template

### E.1 Template Instructions

The program plan is an agreement between the MDAA or the Mission Support Office Official-in-Charge and the program manager. As appropriate, Center Directors also concur with the program plan under separate cover to signify their commitment to supply required resources. The program plan defines the goals and objectives of the program, the environment within which the program operates, and the baseline commitments of the program. The program plan is used by the Governing Body (e.g., OMC) in the review process to assess whether the program is fulfilling its agreement and during independent assessments, to determine if the program is fulfilling its agreement. The program plan is to be updated and approved during the program life cycle if warranted by changes in the stated baseline commitments.

In this program plan template, all subordinate plans, collectively called control plans, are required. They are based on requirements in NASA Policy Directives (NPDs) and NASA Procedural Requirements (NPRs) that affect program/project planning. The control plans can either be part of the program plan or separate stand-alone documents referenced in the appropriate part of the program plan. In the case of the latter, the program plan contains a summary of and reference to the stand-alone document and the approval authority for the stand-alone control plan is the program manager.

Each section of the program plan template is required. If a section is not applicable to a particular program, indicate by stating so 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 must be obtained in accordance with the waiver process for this NPR.

## E.2 Program Plan Title Page

**Program Plan**

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

_____ _____

Mission Directorate or Mission Support Office Official Date

_____ _____

Program Manager Date

Figure E-1 Program Plan Title Page

## E.3 Program Plan Template

**PROGRAM PLAN**
**(PROGRAM TITLE)**

## 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.

### 1.2 GOALS AND OBJECTIVES

State program goals and specific objectives and provide clear traceability to the Agency Vision, Mission, and strategic goals. Program performance goals and their relationship to NASA program goals and objectives set forth in NPD 1000.1, should be expressed in an objective, quantifiable, and measurable form. Goals and objectives should include specific commitments to program 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.

Describe how the program will relate to other organizations within NASA and outside NASA. Reference the Acquisition Plan of this document, or provide the following information here:

a. For organizations within NASA, describe the roles of each in the program, including cross-cutting technology efforts and institutional infrastructure needs.

b. 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. List the internal and external agreements necessary for program success and their projected dates of approval.

### 1.4 CUSTOMER AND STAKEHOLDER DEFINITION

State the main customers and stakeholders of the program (e.g., science community, technology, community, public, education community, Mission Directorate or Mission Support Office sponsor(s)) and the process to be used to ensure customer and stakeholder advocacy.

### 1.5 PROGRAM AUTHORITY

Identify the location (Headquarters or Centers) where the program manager resides. Identify the approving official for projects. Describe the chain of accountability and decision path that outlines the roles and responsibilities of the Mission Directorate or

Mission Support Office sponsor(s), program manager, Center Director, and other authorities as required.

## 1.6 MANAGEMENT APPROACH AND GOVERNANCE STRUCTURE

Describe the program management structure, including each participating organization's responsibilities, integration into the sponsoring Mission Directorate or Mission Support Office, and NASA Center(s) participation. Describe clear lines of authority from projects and Centers to the program to the Mission Directorate or Mission Support Office and frequency of reporting for each. Illustrate the organization graphically. Identify the responsibilities of each participating organization as they relate to their respective requirement allocations referenced in the REQUIREMENTS BASELINE below. Describe the process by which projects are formulated, approved, and terminated.

Identify all significant interfaces with other contributing organizations. Describe the process for problem reporting at the program level and subsequent decision making, clearly describing the roles and responsibilities of all organizations. Identify specific management tools to support management in planning and controlling the program. Describe any use of special boards and committees.

Describe the Mission Directorate or Mission Support Office, program manager, and project manager responsibilities for developing, concurring, and approving principal program documents, such as the FAD (or equivalent), the program plan, project plans, and acquisition-related documents, reports associated with major reviews, and other key program activities.

## 1.7 IMPLEMENTATION APPROACH

Describe briefly the implementation approach of the program, including the acquisition strategy (e.g., NASA HQ offices, NASA Centers, in-house, contractor primes), partners, and partner contributions, if appropriate. Include make-or-buy plan and trade studies.

# 2.0 PROGRAM BASELINE

## 2.1 REQUIREMENTS BASELINE

Document the program requirements, including performance requirements and programmatic requirements. Describe the process by which program requirements are validated for compliance. Describe the process for controlling changes to the requirements. Link the requirements to the program success criteria.

For multiple projects within a program, describe how program requirements will be allocated to the respective projects. Document the objectives and the program requirements on the projects as they are formulated and how the requirements flow down from the program.

Document the traceability of requirements and flow-down to projects. If the program characteristics indicate a greater emphasis is necessary on maintaining either technical, cost, or schedule, then this section also identifies which is more important. Programmatic

success criteria such as cost, schedule, and technical performance goals are linked to program requirements and are expressed in objective, quantifiable, and measurable form. Goal and threshold values are established for each success criterion.

## 2.2 WBS BASELINE

Provide the program's WBS and WBS dictionary to the second level. For Internal Use Software projects, develop the Level 2 WBS to meet the requirements of NASA's NPR 9250.1 Property, Plant, and Equipment and Operating Materials and Supplies, Chapter 5 Internal Use Software.

## 2.3 SCHEDULE BASELINE

Present a summary schedule of the program's integrated master schedule, including all critical milestones, major events, and Agency and program-level reviews throughout the program life cycle. The summary schedule should include the logical relationships (interdependencies) for the critical milestones, major events, program reviews, and critical paths as appropriate.

## 2.4 RESOURCE BASELINE

Present the program's funding requirements by fiscal year. State the New Obligational Authority (NOA) in real-year dollars for the prior, current, and remaining years. The funding requirements are to be consistent with the program's WBS and include funding for all cost elements required by the Agency's accounting procedures. The funding baseline provides separate funding requirements for each WBS Level 2 element.

Present the program-specific (i.e., not individual project) workforce requirements by fiscal year, consistent with the program funding requirements and WBS. Identify, if possible, the elements of work that may be done in-house or contractor, as well as the Centers that perform the work.

Describe the program infrastructure requirements (acquisition, renovations, and/or use of real property/facilities, aircraft, personal property, 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.

# 3.0 PROGRAM CONTROL PLANS

## 3.1 TECHNICAL, SCHEDULE, AND COST CONTROL PLAN

Document how the program plans to control program requirements, technical design, schedule, and cost to achieve its high-level requirements. This control plan will include the following:

a. Describe the plan to monitor the requirements, technical design, schedule, and cost of the program.

b. Describe the program's performance metrics in objective, quantifiable, and measurable terms and document how the metrics are traced from the program's high-

level requirements. Establish goal and threshold values for the performance metrics to be achieved at each KDP, as appropriate. In addition, document the minimum program success criteria associated with the high-level program requirements that, if not met, trigger consideration of a Termination Review.

c. Describe the plan to control the requirements, technical design, schedule, and cost of the program to high-level program requirements.

d. 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, the program information management systems, the budgeting and cost accounting system.

e. Describe how the program will monitor and control the integrated master schedule.

f. Describe how the program will utilize its technical, schedule, and cost reserves to control the baseline.

g. Describe how the program plans to report technical, schedule, and cost status to the Mission Directorate or Mission Support Office, including frequency and the level of detail.

h. Describe how the program will address technical waivers and how dissenting opinions will be handled.

## 3.2 RISK MANAGEMENT PLAN

Summarize how the program will implement the NASA continuous risk management process in accordance with NPR 8000.4. Include the initial Significant Risk List and appropriate actions to mitigate each risk. Include hazard analysis to identify safety risks. Programs with international contributions plan for, assess, and report on risks due to international partners and plan for contingencies.

## 3.3 ACQUISITION PLAN

The Program Acquisition Plan is developed by the program manager, supported by the Office of Procurement. It documents an integrated acquisition strategy that enables the program to meet its objectives, provides the best value to NASA, and complies with the FAR and the NASA FAR Supplement. The Acquisition Plan should:

a. Identify all major proposed acquisitions (such as design studies, hardware and software development, and operations support) in relation to the program WBS. Provide summary information on each such proposed acquisition, including a Contract WBS; major deliverable items; type of procurement (competitive, sole source); type of contract (cost reimbursable, fixed-price); source (institutional, contractor, other Government organizations); procuring activity; and, surveillance approach.

b. Describe completed or planned studies supporting make-or-buy decisions, considering NASA's in-house capabilities and the maintenance of NASA's core competencies.

c. Describe all agreements, memoranda of understanding, barters, in-kind contributions, and other arrangements for collaborative and/or cooperative relationships. List all such agreements (the configuration control numbers and the date signed or projected dates of approval) necessary for program success. Include or reference all

agreements concluded with the authority of the program manager and reference agreements concluded with authority above the program manager.

## 3.4 TECHNOLOGY DEVELOPMENT PLAN

Describe the technology assessment, development, management, and acquisition strategies needed to achieve the program's objectives. In the Technology Development Plan:

a. Describe how the program will assess its technology development requirements, including how the program will evaluate the feasibility, availability, readiness, cost, risk, and benefits of the new technologies.

b. Describe how the program will identify opportunities for leveraging ongoing technology efforts.

c. Describe the program's alternative development strategies for technologies that do not mature as expected.

d. Describe how the program will remove technology gaps, including maturation, validation, and insertion plans, quantifiable milestones, decision gates, and resources required.

e. 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.

## 3.5 REVIEW PLAN

Summarize the program's approach for conducting a continuum of reviews for the program life cycle. Explain the reporting requirements for program reviews. Provide the technical, scientific, schedule, cost and other criteria, which will be utilized in the consideration of a termination review.

## 3.6 INFORMATION AND CONFIGURATION MANAGEMENT PLAN

Describe the configuration management approach that the program team will implement. Describe the structure of the configuration management organization and tools to be used. Describe the methods and procedures to be used for configuration identification, configuration control, interface management, configuration traceability, and configuration status accounting and communications. Describe how configuration management will be audited and how contractor configuration management processes will be integrated with the program. Reference the stand-alone program Configuration Management Plan, if applicable.

Explain the program's approach to management of information across its life cycle, including the development and maintenance of an electronic program library and designation of a program records manager. Describe the organization, tools, and procedures to be used to ensure program records identification, control, and disposition in accordance with NPR 1441.1.

Describe the program's approach to knowledge capture as well as the methods for contributing knowledge to other entities and systems, including compliance with NPD 2200.1, Management of NASA Scientific and Technical Information, and

NPR 2200.2B, Requirements for Documentation, Approval, and Dissemination of NASA Scientific and Technical Information.

Describe the program's approach to capturing lessons learned in accordance with NPR 7120.6, Lessons Learned Process.

## 3.7 EXPORT CONTROL PLAN

Describe how the program will comply with U.S. export control laws and regulations and NASA's Export Control Program as documented in NPR 2190.1, NASA Export Control Program. It should describe the partners' (international, contractors, universities) roles and responsibilities, show the schedule of anticipated transfers, describe a plan to comply with NASA export-control transfer requirements (identification and classification of controlled data/articles, exemptions/exceptions, licensing, documentation, recordkeeping, and reporting). Program managers must consult with the NASA Export Administrator/ Center Export Administrator during plan development.

## 3.8 EDUCATION AND PUBLIC OUTREACH PLAN

Describe planned efforts and activities to improve science literacy by engaging the public in understanding the program, its objectives, and benefits. Summarize plans to stimulate interest in science, engineering, and technology through program-related outreach activities. Summarize plans to flow the education and public outreach requirements to projects within the program.

# 4.0 WAIVERS LOG

Identify requirements for which a waiver has been requested and approved. Include the rationale for the request.

# 5.0 CHANGE LOG

Record changes to the program plan.

# 6.0 APPENDICES

Appendix A - Acronyms
Appendix B - Definitions

# APPENDIX F. Project Plan Template

## F.1 Template Instructions

The project plan is an agreement between the project manager, program manager, and the Mission Directorate or Mission Support Office. 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 used by the project Governing Body in the review process and during independent assessments to determine if the project is fulfilling its agreement. 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 project-level requirements or the baseline commitments.

In this project plan template, all subordinate plans, collectively called control plans, are required. They are based on requirements in NASA NPDs and NPRs that affect program/project planning. The control plans can either be part of the project plan or separate stand-alone documents referenced in the appropriate part of the project plan. In the case of the latter, the project plan contains a summary of and reference to the stand-alone document and the approval authority for the stand-alone control plan is the project manager.

Each section of the project plan is required for all projects. If a section is not applicable to a particular project, indicate by stating so 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 must be obtained in accordance with the waiver process for this NPR.

## F.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 or Mission Support Office Official | Date |
| _____ | _____ |
| Center Director, if appropriate | Date |
| _____ | _____ |
| Program Manager | Date |
| _____ | _____ |
| Project Manager | Date |

Figure F-1: Project Plan Title Page

## F.3 Project Plan Template

# [*PROJECT NAME*] PROJECT PLAN

## 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.

### 1.2 OBJECTIVES

State the specific project objectives, high-level performance goals, and their relationship to the program objectives. Include performance, schedule, cost, and technology development objectives, as applicable.

### 1.3 PROJECT DESCRIPTION AND TECHNICAL APPROACH

Describe briefly the project and the project design. Include key characteristics of the project and the key phases and events on the project timeline. Use drawings, figures, charts, etc., for clarification. Describe planned project results, assessment, and reporting. For IT projects, describe the system's relationship to the NASA Enterprise Architecture.

Provide a brief description of the technical approach. Describe the systems to be developed (hardware and software systems, constraints, system interfaces, and facilities). Identify major constraints affecting system development (e.g., cost, schedules, agreements, etc.).

### 1.4 PROJECT AUTHORITY, GOVERNANCE STRUCTURE, MANAGEMENT STRUCTURE AND IMPLEMENTATION APPROACH

Identify the organization where the project manager resides. Describe the governance structure. Identify the governing body responsible for oversight of the project (e.g., SMC, OMC, PMC, other committee). Describe Centers' responsibilities, if any. Identify the project's Decision Authority. Describe the chain of accountability and decision path that outlines the roles and responsibilities of the project manager, program manager, and other authorities.

Define the relationships among various elements and organizations within the project structure, including all stakeholders, team members, and supporting organizations. Describe the project's approach for fostering effective upward and downward communication of critical management, technical, risk, and safety information. Describe the process that the project will follow to communicate with the program manager, Governing Body, and Decision Authority. 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 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 Mission Directorate or Mission Support Office, participating Centers, and other participating organizations. Illustrate the organization graphically.

Describe briefly the implementation approach of the project, including the acquisition strategy (e.g., in-house, NASA Centers, contractor primes), partners, and partner contributions, if appropriate. Describe briefly other program/project dependences with NASA and other agencies, international activities, studies, and agreements. Include make-or-buy plan and trade studies.

### 1.5 CUSTOMER AND STAKEHOLDER DEFINITION

Describe the customers and stakeholders of the project (e.g., business community, science community, technology community, public, education community, parent program, and Mission Directorate or Mission Support Office sponsor) and the process to be used to ensure customer advocacy within the project.

## 2.0 PROJECT BASELINE

Project baselines (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) form the basis for the Management Agreement, which is presented in preliminary form at KDP B and then approved at KDP C in the KDP C Decision Memorandum. The latest approved Decision Memorandum is attached to the Project Plan.

The Management Agreement is generally a summary of these project baselines and is updated as required in accordance with paragraph 2.72 of this NID to NPR 7120.7 when changes warrant such action.

### 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 developing the WBS, meet the requirements of NID-9250, Identifying Capital Assets and Capturing Their Cost and, for projects which include internal use software, the requirements of NASA’s NPR 9250.1 Property, Plant, and Equipment and Operating Materials and Supplies, Chapter 5 Internal Use Software.

### 2.3 SCHEDULE BASELINE

Present a summary schedule of the project’s integrated master schedule, including all critical milestones, major events, and Agency and project-level reviews throughout the project life cycle. The summary schedule should include the logical relationships (interdependencies) for the critical milestones, major events, project reviews, and critical paths, as appropriate.

### 2.4 RESOURCE BASELINE

Present the project funding requirements by fiscal year. State the funding in real-year dollars for the prior, current, and remaining years. The funding requirements are to be consistent with the project WBS and include funding for all cost elements required by the Agency’s accounting procedures. The funding baseline provides separate funding requirements for each WBS Level 2 element.

Present the project’s workforce requirements by fiscal year, consistent with the project funding requirements and WBS. The estimate encompasses all work required to achieve project objectives. Include full accounting of civil service workforce requirements on the providing organizations for the

prior (e.g., actuals), current, and remaining years of the project life cycle. Identify, if possible, the elements of work that may be done by contractors and the Centers that perform the work.

Describe the project infrastructure requirements (acquisition, renovations, and/or use of real property/facilities, aircraft, personal property, 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.

## 3.0 PROJECT CONTROL PLANS

### 3.1 TECHNICAL, SCHEDULE, AND COST CONTROL PLAN

Document how the project plans to control project requirements, technical design, schedule, and cost to achieve its project-level requirements. This control plan will include the following:

a. Describe the plan to monitor the requirements, technical design, schedule, and cost of the project.

b. Describe the project's performance metrics in objective, quantifiable, and measurable terms, and document how the metrics are traced from the project-level requirements. Establish goal and threshold values for the performance metrics to be achieved at each KDP, as appropriate. Establish the thresholds for the difference between the development cost EAC or a schedule milestone listed on the project life cycle chart in Figure 2-4 of this NPR that will trigger a written notice and a recovery plan to the program manager. In addition, document the minimum project success criteria associated with the project-level requirements that, if not met, trigger consideration of a Termination Review.

c. Describe the plan to control the requirements, technical design, schedule, and cost of the project to project-level requirements.

d. Describe how the project will address safety issues, if any, associated with project execution and implementation.

e. Describe the project's implementation of Earned Value Management (EVM). The following requirements apply:

(1) The project's EVM approach is consistent with the participating Center's best practices.

(2) The project's EVM approach is in-place by KDP C and implemented in Phase C through KDP E.

(3) Project EVM reporting begins within 60 days after the start of Phase C.

(4) As a minimum, EVM principles, as defined by ANSI/EIA-748, *Earned Value Management Systems*, apply from KDP C through KDP E, if the project's life-cycle cost is at or greater than $20M.

(5) If the project's primary NASA Center has a fully validated Earned Value Management System (EVMS), the project uses that system rather than EVM principles.

(6) For contracts and subcontracts, application of an EVMS is required as follows:

(i) For development or production (including flight and ground support) contracts and subcontracts valued at $20M or more, the contractor EVMS must comply with the guidelines in ANSI/EIA-748.

(ii) For development or production (including flight and ground support) contracts and subcontracts valued at $50M or more, the contractor EVMS has been formally determined compliant with ANSI/EIA-748 by the cognizant Federal contract management agency.

(iii) EVM is not required for grants, nondevelopmental level-of-effort engineering support services, steady-state operations, basic and applied research, and routine services such as janitorial services or grounds maintenance services; however, application is at the discretion of the program/project manager.

(iv) A Contract Performance Report (CPR), Integrated Master Schedule (IMS), WBS, and WBS dictionary are required whenever EVM is required on contracts and subcontracts.

(v) In accordance with NFS Part 1834, require IBRs through Phase D for contracts requiring EVM. Schedule such reviews not later than 180 calendar days after contract award or the exercise of significant

contract options, or not later than 60 calendar days after a significant funding or work scope realignment.

f. Describe any additional specific tools the project will use to implement the project control processes, e.g., the requirements management system, the project scheduling system, the project information management systems, and the budgeting and cost accounting system.

g. Describe how the project will monitor and control the integrated master schedule.

h. Describe how the project will utilize its technical, schedule, and cost reserves to control the baseline.

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

j. Describe how the project will address technical waivers and how dissenting opinions will be handled.

## 3.2 RISK MANAGEMENT PLAN

Summarize how the project will implement a continuous risk management process in accordance with NPR 8000.4. Include the initial Significant Risk List and appropriate actions to mitigate each risk. Include hazard analysis to identify safety risks. Projects with international contributions plan for, assess, and report on risks due to international partners and plan for contingencies.

## 3.3 ACQUISITION PLAN

The Project Acquisition Plan is developed by the project manager and supported by the Center's Office of Procurement. It documents an integrated acquisition strategy that enables the project to meet its objectives, provides the best value to NASA, and complies with the FAR and the NASA FAR Supplement. The Acquisition Plan should:

a. Identify all major proposed acquisitions (such as design studies, hardware and software development, and operations support) in relation to the project WBS. Provide summary information on each such proposed acquisition, including a Contract WBS; major deliverable items; type of procurement (competitive, sole source); type of contract (cost-reimbursable, fixed-price); source (institutional, contractor, other Government organizations); procuring activity; and surveillance approach.

b. Describe completed or planned studies supporting make-or-buy decisions, considering NASA's in-house capabilities and the maintenance of NASA's core competencies.

c. If systems contain software, describe the project's approach for complying with NPR 7150.2.

d. Describe all agreements, memoranda of understanding, barters, in-kind contributions, and other arrangements for collaborative and/or cooperative relationships. List all such agreements (the configuration control numbers and the date signed or projected dates of approval) 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.

## 3.4 TECHNOLOGY DEVELOPMENT PLAN

Describe the technology assessment, development, management, and acquisition strategies needed to achieve the project's objectives. In the Technology Development Plan:

a. Describe how the project will assess its technology development requirements, including how the project will evaluate the feasibility, availability, readiness, cost, risk, and benefits of the new technologies.

b. Describe how the project will identify opportunities for leveraging ongoing technology efforts.

c. Describe the project's alternative development strategies for technologies that do not mature as expected.

d. Describe how the project will remove technology gaps, including maturation, validation, and insertion plans, quantifiable milestones, decision gates, and resources required.
e. 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.

## 3.5 REVIEW PLAN

Summarize the project's approach for conducting a continuum of reviews for the project life cycle, including peer reviews. Explain the reporting requirements for project reviews. Provide the management, technical, schedule, cost, and other criteria, which will be utilized in the consideration of a termination review.

For IT projects, use Appendix G of this document for guidance to provide the names, purposes, content, and timing of the critical milestone project reviews.

## 3.6 INFORMATION AND CONFIGURATION MANAGEMENT PLAN

Describe the configuration management approach that the project team will implement. Describe the structure of the configuration management organization and tools to be used. Describe the methods and procedures to be used for configuration identification, configuration control, interface management, configuration traceability, and configuration status accounting and communications.

Describe the project's approach to knowledge capture, as well as the methods for contributing knowledge to other entities and systems. This includes the development and maintenance of an electronic project library.

Describe the program's approach to capturing lessons learned in accordance with NPR 7120.6.

## 3.7 IT SECURITY PLAN

Describe the project's plans for ensuring security and address the following elements:
a. IT Security Requirements: Document the project's approach to implementing IT security requirements in accordance with NPR 2810.1.

## 3.8 DATA CONVERSION PLAN

Describe the plan that the project will execute to ensure that required data from existing electronic and/or manual systems are included in the new information system, including at a minimum the following elements:
a. Emergency Response Requirements: Describe the project's emergency response plan in accordance with NPR 1040.1, NASA Continuity of Operations (COOP) Planning Procedural Requirements, which defines the range and scope of potential crises and specific response actions, timing, of notifications and actions, and responsibilities of key individuals.
b. The scope of the data conversion plan as it relates to the project.
c. An overview of security considerations associated with the data conversion, including the IT security categorizations of the data to be converted.
d. A description of the data, including its IT security categorization that will be converted from existing systems (electronic and manual) to the new systems.
e. A description of data cleansing or other operations that will be conducted on the data prior to its conversion.

f. A description of the data, including its IT security categorization, that will not be moved from existing systems (electronic and manual) to the new system, with rationale for not moving the data to the new system

g. A description of how the data that will not be moved to the new system will be dispositioned in accordance with the requirements of NPR 1441.1 and other Agency requirements.

h. A description of the tools, facilities, and approaches that will be used for converting data from existing systems to the new systems.

i. Roles and responsibilities of organizations that will perform data conversion.

j. A description of how the project will determine that the data have been converted successfully, including the role of the data owner in ensuring successful conversion.

k. The timeframes for when data conversion will begin and when it will be completed, following the life-cycle designations of this document and integrated with the overall project schedule.

l. Methods (e.g., meetings and communications) for keeping all organizations informed about the status of the data conversion plan.

## 3.9 EXPORT CONTROL PLAN

Describe how the project will comply with U.S. export control laws and regulations and NASA's Export Control Program as documented in NPR 2190.1. It should describe the partners' (international, contractors, universities) roles and responsibilities, show the schedule of anticipated transfers, describe a plan to comply with NASA export-control transfer requirements (identification and classification of controlled data/articles, exemptions/exceptions, licensing, documentation, recordkeeping, and reporting). Project managers must consult with the NASA Export Administrator/Center Export Administrator during plan development.

## 4.0 WAIVERS LOG

Identify those requirements for which a waiver 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 G. Technical Review Entrance and Success Criteria for IT Projects

This appendix describes the recommended best practices for technical reviews conducted as a part of information technology projects. During creation of the project plan, the project manager works with the program manager to appropriately tailor the project-level review entrance criteria and success criteria. The final set of required entrance and success criteria should reflect the nature of the system under development; be appropriate for the project's size, risk, and importance; and be achievable with approved project resources and on an acceptable schedule. The review plan section of the project plan documents the tailoring of the reviews.

## G.1 System Concept Review

The SCR evaluates the scope, cost benefit analysis, and a recommended solution/concept for the product or service to be delivered for the purpose of receiving approval, formalized via the Formulation Authorization Document, to proceed to the Formulation Phase. Assesses the effect on the "as-is" and "to-be" enterprise architecture. Ensures applicable security controls have been considered.

**Table G-1 – SCR Entrance and Success Criteria**

| System Concept Review | |
|---|---|
| **Entrance Criteria** | **Success Criteria** |
| 1. System goals and objectives.<br>2. Analysis of alternative concepts to show at least one is feasible.<br>3. Concept of operations.<br>4. Preliminary risk assessment, including technologies and associated risk management/ mitigation strategies and options. | 1. System objectives are clearly defined and stated and are unambiguous and internally consistent.<br>2. The preliminary set of requirements satisfactorily provides a system which will meet the system objectives.<br>3. The system is feasible. A solution has been identified which is technically feasible. A rough cost estimate is within an acceptable cost range.<br>4. The concept evaluation criteria to be used in candidate systems evaluation have been identified and prioritized.<br>5. The need for the system has been clearly identified.<br>6. The cost and schedule estimates are credible.<br>7. A technical search was done to identify existing assets or products that could satisfy the mission or parts of the system.<br>8. Technical planning is sufficient to proceed to the next phase.<br>9. Risk and mitigation strategies have been identified and are acceptable. |

## G.2 System Requirements Review

The SRR examines the functional, technical, performance, and security requirements for the system and the preliminary project plan and ensures that the requirements and the selected concept will satisfy the system objectives.

**Table G-2 – SRR Entrance and Success Criteria**

| System Requirements Review | |
|---|---|
| **Entrance Criteria** | **Success Criteria** |
| 1. A preliminary SRR agenda, success criteria, and charge to the board have been agreed to by the technical team, project manager, and review chair prior to the SRR.<br>2. The following technical products for hardware and software system elements are available to the cognizant participants prior to the review:<br>a. System requirements document.<br>b. System software functionality description.<br>c. Concept of operations.<br>d. Preliminary system requirements allocation to the next lower-level system.<br>e. Updated cost estimate.<br>f. Risk assessment and mitigations.<br>g. Configuration management plan.<br>h. Initial document tree.<br>i. Verification and validation approach.<br>j. Information/system security categorization.<br>k. Identification of personally identifiable information.<br>l. Identification of records retention requirements.<br>m. Identification of required system security controls.<br>n. Preliminary software development/management plan.<br>o. Other specialty disciplines, as required. | 1. The project utilizes a sound process for the allocation and control of requirements throughout all levels, and a plan has been defined to complete the definition activity within schedule and cost constraints.<br>2. Top-level requirements definition is complete, and interfaces with external entities and between major internal elements have been defined.<br>3. Requirements allocation and flow down of key driving requirements have been defined down to subsystems.<br>4. Preliminary approaches have been determined for how requirements will be verified and validated down to the subsystem level.<br>5. Major risks have been identified, and viable mitigation strategies have been defined.<br>6. IT security, privacy, and records retention requirements are complete and have been incorporated into project requirements documentation.<br>7. The preliminary software development/management plan meets the requirements of NPR 7150.2. |

## G.3 Preliminary Design Review

The PDR demonstrates that the preliminary design meets all system requirements with acceptable risk and within the cost and schedule constraints and establishes the basis for proceeding with detailed design. It will show that the correct design options have been selected, interfaces have been identified, and verification methods have been described.

**Table G-3 – PDR Entrance and Success Criteria**

| Preliminary Design Review | |
|---|---|
| **Entrance Criteria** | **Success Criteria** |
| 1. Successful completion of the SRR and responses have been made to all SRR Requests for Action (RFAs), or a timely closure plan exists for those remaining open.<br>2. A preliminary PDR agenda, success criteria, and charge to the board have been agreed to by the technical team, project manager, and review chair prior to the PDR.<br>3. PDR technical products listed below for both hardware and software system elements have been made available to the cognizant participants prior to the review:<br>a. Updated baselined documentation, as required.<br>b. Preliminary subsystem design specifications for each configuration item (hardware and software) with supporting tradeoff analyses and data, as required. The preliminary software design specification needs to include a completed definition of the software architecture and a preliminary database design description as applicable.<br>c. Updated risk assessment and mitigation.<br>d. Updated cost and schedule data.<br>e. Updated logistics documentation, as required.<br>f. Applicable technical plans (e.g., technical performance measurement plan, reliability program plan, quality assurance plan).<br>g. Operational concept.<br>h. Applicable standards.<br>i. Engineering drawing tree.<br>j. Interface control documents.<br>k. Verification/validation plan.<br>l. Plans to respond to regulatory requirements (e.g., Section 508), as required.<br>m. Requirements traceability matrix.<br>n. Disposal plan.<br>o. Technical resource utilization estimates and margins. | 1. Agreement exists for the top-level requirements, including success criteria and any sponsor-imposed constraints, and ensures that these are finalized, stated clearly, and are consistent with the prelim. design.<br>2. The flow down of verifiable requirements is complete and proper or, if not, an adequate plan exists for timely resolution of open items. Requirements are traceable to system goals and objectives.<br>3. The preliminary design is expected to meet the requirements at an acceptable level of risk.<br>4. Definition of the technical interfaces is consistent with the overall technical maturity and provides an acceptable level of risk.<br>5. Adequate technical margins exist with respect to performance requirements.<br>6. Any required new technology has been developed to an adequate state of readiness, or back-up options exist and are supported to make them a viable alternative.<br>7. The project risks are understood, and plans and a process and resources exist to effectively manage them.<br>8. The operational concept is technically sound. It includes (where appropriate) human factors that apply, and requirements for its execution flow down. |

## G.4 Critical Design Review

The CDR confirms that the maturity of the design is appropriate to support proceeding and that it was developed in conjunction with stakeholders, demonstrates that the design meets detailed requirements, and identifies open design issues for the purpose of obtaining a decision to proceed with development and deployment. It reviews the technical architecture to ascertain the effect on the enterprise architecture and reviews the application security design and the inclusion of security controls.

**Table G-4 – CDR Entrance and Success Criteria**

| Critical Design Review | |
|---|---|
| **Entrance Criteria** | **Success Criteria** |
| 1. Successful completion of the PDR and responses has been made to all PDR RFAs, or a timely closure plan exists for those remaining open.<br>2. A preliminary CDR agenda, success criteria, and charge to the board have been agreed to by the technical team, project manager, and review chair prior to the CDR.<br>3. CDR technical work products listed below for both hardware and software system elements have been made available to the cognizant participants prior to the review:<br>a. Updated baselined documents, as required.<br>b. Product build-to specifications for each hardware and software configuration item, along with supporting trade-off analyses and data.<br>c. Development, integration, and test plans and procedures.<br>d. Technical Data Package (e.g., Integrated Schematics, Spares Provisioning List, Interface Control Documents, engineering analyses, specifications).<br>e. Operational limits and constraints.<br>f. Preliminary operations handbook.<br>g. Technical resource utilization estimates and margins.<br>h. Acceptance criteria.<br>i. Verification plan (including requirements and specification).<br>j. Validation plan.<br>k. Disposal plan (including decommissioning or termination).<br>l. Updated risk assessment and mitigation.<br>m. Updated cost and schedule data.<br>n. Updated logistics documentation.<br>o. Software design document(s) (including interface design documents).<br>p. Systems and subsystem certification plans and requirements (as needed). | 1. The detailed design is expected to meet the requirements with adequate margins at an acceptable level of risk.<br>2. Interface control documents are appropriately matured to proceed with development, integration, and test, and plans are in place to manage any open items.<br>3. High confidence exists in the product baseline, and adequate documentation exists and/or will exist in a timely manner to allow proceeding with development, integration, and test.<br>4. The product verification and product validation requirements and plans are complete.<br>5. The testing approach is comprehensive, and the planning for system development, integration, test, and operations is sufficient to progress into the next phase.<br>6. Adequate technical and programmatic margins and resources exist to complete the development within budget, schedule, and risk constraints.<br>7. Risks to system success are understood, and plans and resources exist to effectively manage them. |

## G.5 Test Readiness Review

The TRR evaluates the project's readiness to proceed with testing, ensuring adequate schedule, resources, and management processes are in place. It ensures the completion of an integration test plan and the system's readiness for execution of integration testing.

**Table G-5 – TRR Entrance and Success Criteria**

| Test Readiness Review | |
|---|---|
| **Entrance Criteria** | **Success Criteria** |
| 1. The objectives of the testing have been clearly defined and documented, and all of the test plans, procedures, environment, and the configuration of the test system support those objectives.<br>2. Configuration of system under test has been defined and agreed to. All interfaces have been placed under configuration management or have been defined in accordance with an agreed-to plan, and a version description document has been made available to TRR participants prior to the review.<br>3. All applicable functional, unit level, subsystem, system, and qualification testing has been conducted successfully.<br>4. All TRR specific materials such as test plans, test cases, and procedures have been available to all participants prior to conducting the review.<br>5. All known system discrepancies have been identified and dispositioned in accordance with an agreed-upon plan.<br>6. All previous design review success criteria and key issues have been satisfied in accordance with an agreed-upon plan.<br>7. All required test resources—people (including a designated test director), facilities, test articles, test instrumentation, and other test enabling products—have been identified and are available to support required tests.<br>8. Roles and responsibilities of all test participants are defined and agreed to.<br>9. Test contingency planning has been accomplished, and all personnel have been trained. | 1. Adequate test plans are completed and approved for the system under test.<br>2. Adequate identification and coordination of required test resources are complete.<br>3. Previous component, subsystem, and system test results form a satisfactory basis for proceeding into planned tests.<br>4. Risk level is identified and accepted by program/competency leadership, as required.<br>5. Plan to capture any lessons learned from the test program is established.<br>6. The objectives of the testing have been clearly defined and documented, and the review of all the test plans, as well as the procedures, environment, and the configuration of the test item, provide a reasonable expectation that the objectives will be met.<br>7. The test cases have been reviewed and analyzed for expected results, and the results are consistent with the test plans and objectives.<br>8. Test personnel have received appropriate training in test operation. |

## G.6 Operational Readiness Review

The ORR determines that the project is ready to go-live with the system or service: requirements have been met; the functionality, performance, and security controls have been thoroughly tested; procedures are in place for operations; and that the organization responsible for operations and sustaining engineering is ready to assume responsibility. It ensures a security plan is in place and that system authorization has been received.

**Table G-6 – ORR Entrance and Success Criteria**

| Operational Readiness Review | |
|---|---|
| **Entrance Criteria** | **Success Criteria** |
| 1. All validation testing has been completed.<br>2. Test failures and anomalies from validation testing have been resolved and the results incorporated into all supporting and enabling operational products.<br>3. All operational supporting and enabling products (e.g., facilities, equipment, documents, maintenance, and updated databases) that are necessary for the nominal and contingency operations have been tested and delivered/installed at the site(s) necessary to support operations.<br>4. Approved operations handbook.<br>5. Training has been provided to the users and operators on the correct operational procedures for the system.<br>6. Operational contingency planning has been accomplished, and all personnel have been trained. | 1. The system, including any enabling products, is determined to be ready to be placed in an operational status.<br>2. All applicable lessons learned for organizational improvement and systems operations have been captured.<br>3. All waivers and anomalies have been closed.<br>4. Systems hardware, software, personnel, and procedures are in place to support operations. |

## G.7 Project Completion Review

The PCR provides assurance that the implemented system is performing as expected and that all necessary support requirements are in place and functioning properly. It confirms that the system is operating properly in its production environment and primary responsibility for the system is turned over to the operations and sustaining engineering teams. It is the official closeout of the project and project team. The final project schedule is published, and remaining open risks are transferred, closed, or accepted. At the conclusion of the PCR, the system is considered fully operational.

**Table G-7 –Project Completion Review**

| Project Completion Review | |
|---|---|
| **Entrance Criteria** | **Success Criteria** |
| 1. A preliminary agenda has been coordinated prior to the PCR.<br>2. The following PCR technical products have been made available in a final project report to the cognizant participants prior to the review:<br>a. System verification results.<br>b. System validation results.<br>c. Documentation that the delivered system complies with the established acceptance criteria.<br>d. Documentation that the system performs properly in the expected operational environment.<br>e. Technical data package as updated to include all test results.<br>f. Certification package.<br>g. Updated risk assessment and mitigation.<br>h. Previous milestone reviews have been successfully completed.<br>i. Remaining liens or unclosed actions and plans for closure. | 1. Required tests and analyses are complete and indicate that the system performs properly in the operational environment.<br>2. Risks are known and manageable.<br>3. System meets the established acceptance criteria.<br>4. All operations and training documentation is complete and sufficient for production use of the system.<br>5. Technical data package is complete and reflects the delivered system.<br>6. All applicable lessons learned for organizational improvement and system operations are captured. |

## G.8 Decommissioning Review

The DR confirms the decision to terminate or decommission the system and assesses the readiness of the system for the safe decommissioning and disposal of system assets.

**Table G-8 – DR Entrance and Success Criteria**

| Decommissioning Review | |
|---|---|
| **Entrance Criteria** | **Success Criteria** |
| 1. Requirements associated with decommissioning and disposal are defined.<br>2. Plans are in place for decommissioning, disposal, and any other removal from service activities.<br>3. Resources are in place to support decommissioning and disposal activities, plans for disposition of project assets, and archival of essential data and official records.<br>4. Current system capabilities are described.<br>5. The NASA Enterprise Architecture team has been notified that a DR is planned for the system and will be notified of the results of the DR. | 1. The reasons for decommissioning disposal are documented.<br>2. The decommissioning and disposal plan is complete, approved by appropriate management, and compliant with applicable Agency policies.<br>3. All personnel have been properly trained for the nominal and contingency procedures.<br>4. Risks associated with the disposal have been identified and adequately mitigated. Residual risks have been accepted by the required management.<br>5. Plans for disposition of system-related assets (i.e., hardware, software, facilities) have been defined and approved.<br>6. Plans for archival and subsequent analysis of system data have been defined and approved. Arrangements have been finalized for the execution of such plans. Plans for the capture and dissemination of appropriate lessons learned during system operation have been defined and approved. Adequate resources (schedule, budget, and staffing) have been identified and are available to successfully complete all decommissioning, disposal, and disposition activities, including the dispositioning of official records as required by NPR 1441.1.<br>7. IT infrastructure, including documentation and systems that interface with the decommissioned system, are planned to be modified to reflect the system termination. |

## Appendix H. Standard Work Break (WBS) for IT Projects

## H.1 Business Rules for Using and Implementing the new WBS Structure

a. The standard IT project WBS applies to new projects established from the effective date of this guidance, forward.
b. The standard IT project WBS applies to the phases of the project's life cycle from pre-formulation through delivery into production and implementation at all related sites. Where the IT infrastructure is turned over to operations for long term management and operations, decommissioning will be part of the on-going systems management asset management processes. The project will end when the assets are under the management and control of systems management.
c. The standard IT project WBS applies to IT projects in the scope of NPR 7120.7.
d. IT projects will use the standard Level 1/2 WBS elements. Specifically:

(1) The Project Name will be WBS Level 1.

(2) The title of each WBS Level 2 element can be modified to facilitate project-unique titles, but the content of each must remain the same. If the linkage of the project-unique title to the standard title is not intuitive, the project-unique title is cross-referenced to the standard.

(3) If the set of standard WBS Level 2 elements does not comprise an exhaustive set of WBS elements, additional WBS elements may be added horizontally (i.e., at Level 2) as long as their content does not fit into the content of any existing standard WBS elements.

(4) For each standard WBS Level 2 element, the subordinate (children) WBS elements at Level 3 and lower will be determined by the project.

(5) The Level 3 and lower elements of standard WBS Level 2 elements can differ from project to project but will include only work that rolls up to the standard WBS Dictionary definition of the standard Level 2 element.

(6) If there is no work to fit into a standard WBS element, then an inactive placeholder element (and an inactive placeholder financial code) will be established.

(7) A single WBS will be used for both technical/business management and reporting.

(8) The management activities required to control each WBS element may differ from project to project and could be contained within the WBS or entirely contained within the Project Management WBS (XXXXXX.01).

e. Changes to the standard IT project WBS will be governed by the waiver approval process stated in NPR 7120.7.

## H.2 STANDARD IT WBS

The IT Standard WBS provides the needed flexibility for the wide variety of IT projects including Software Development, Hardware Acquisition/Deployment, Service/Process Change etc.

To align with the agency existing project standards, the Standard WBS for IT projects will follow the structure listed below:

| | |
|---|---|
| XXXXXX | Project |
| XXXXXX.01 | Project Management |
| XXXXXX.02 | Systems Engineering |
| XXXXXX.03 | Safety and Mission Assurance |
| XXXXXX.04 | Systems/Modules Development |
| XXXXXX.05 | Systems Integration and Test |
| XXXXXX.06 | Security Validation |
| XXXXXX.07 | System Deployment |
| XXXXXX.08 | Operational Site Implementation |
| XXXXXX.09 | Outreach and Education |

An example of an expanded WBS structure for a sample project is attached to this document.

## H.3 Mapping Proposed Standard IT WBS to NPR 7120.7 Master Milestones and Deliverables and other Sample Activities

The following table maps the proposed standard IT WBS to specific project deliverables in NPR 7120.7. A schedule template will be provided that identifies these project deliverables at WBS Level 3 and lower, as appropriate.

| XXXXXX | Project Name | Sample Products or Enabling Support |
|---|---|---|
| **XXXXXX.01** | Project Management | FAD<br>Project Plan<br>Communications Plan<br>Risk Management<br>SCR KDP A<br>EARP<br>SRR KDP B<br>NAR<br>PDR KDP C<br>CDR KDP D<br>TRR<br>ORR KDP E<br>PCR |
| **XXXXXX.02** | System Engineering | System Level Requirements and Design/analysis<br>IT Security Requirements<br>EA Requirements |
| **XXXXXX.03** | Safety and Mission Assurance | Compliance Activities (NPD 8700.1)<br>Inspections |
| **XXXXXX.04** | System/Modules Development | Detailed Design<br>Subsystem/Unit Testing |

| | | |
|---|---|---|
| | | Subsystem Configuration |
| **XXXXXX.05** | System Integration, Verification, Validation | System Test<br><br>System Test Plan<br><br>System Integration Test<br><br>System Acceptance Test<br><br>Test Results Report<br><br>Operational Readiness Test |
| **XXXXXX.06** | Security Validation | INFORMATION SECURITY SYSTEM CONTROLS (ISSC)/INFORMATION SYSTEM (IS)<br><br>Compliance Activities (NPR 2810.1) |
| **XXXXXX.07** | System Deployment | Change Package<br><br>Release Plan<br><br>Backup/Contingency Plans |
| **XXXXXX.08** | Operational Site Implementations | Center Readiness Activities<br><br>Center/Site Readiness Reviews<br><br>Migration/Transition Plans |
| **XXXXXX.09** | Outreach and Training | Stakeholder Definition<br><br>Stakeholder Analysis<br><br>Communications<br><br>Operations Training<br><br>End-User Training<br><br>Outreach and Education Events |

## H.4 Standard WBS for IT Projects – WBS Dictionary

**Element XXXXXX.01 - Project Management:** All activities associated with business and administrative planning, organizing, directing, coordinating, analyzing, controlling, status reporting, and approval processes used to accomplish overall project objectives, which are not associated with specific hardware or software elements. This element includes project KDP reviews and system engineering reviews. It also includes all activities associated with awarding and managing project-related contracts, including technical support contracts. Activities associated with planning and finalizing staffing requirements, facilities, administrative and standard operating procedures are also included. It excludes costs associated with technical planning and management and costs associated with delivering specific engineering, hardware and software products.

**Element XXXXXX.02 - Systems Engineering:** The technical and management efforts of directing and controlling an integrated engineering effort for the project. This element includes the efforts to define the project IT system(s) and operations delivery processes, conducting trade studies, the integrated planning and control of the technical program efforts of design engineering, software engineering, specialty engineering, system architecture development and integrated test planning, system requirements writing, configuration control, technical oversight, control and monitoring of the technical program. Documentation products include requirements and preliminary design specifications, interface control documents (ICDs), and the system engineering review presentations.

**Element XXXXXX.03 – Safety and Mission Assurance:** The technical and management efforts of directing and controlling the safety and mission assurance elements of the project. This element includes design, development, review, and verification of practices and procedures and mission success criteria intended to assure that the delivered product meets performance requirements and function for its intended lifetime. This element excludes product assurance efforts directed at partners and subcontractors other than a review/oversight function, and the direct costs of environmental testing. Full compliance with applicable sections of NPD 8700.1 is required for each project

**Element XXXXXX.04 – System/Modules Development** All activities associated with designing, developing and/or procuring hardware and software configuration items, developing prototypes at the development facility and the resulting integration, unit testing, assembly and checkout. The detailed design is completed for each subsystem and a composite detailed design specifies the relationship of each subsystem or module.

**Element XXXXXX.05 - System Integration, Verification and Validation:** All activities associated with testing, analyzing and evaluating in order to verify and validate that products meet specifications, satisfy requirements and are operationally suitable and effective. This element includes system integration and user acceptance testing.

**Element XXXXXX.06 – Security Validation:** The technical and management efforts of directing and controlling the security related elements of the project. This element includes security assessment, security categorization, Certification and Accreditation activities, scanning activities and final validation for the capability to move into full operation.

**Element XXXXXX.07– System Deployment:** All activities required to deploy the system/subsystems/hardware, etc into the production environment using the ITIL "Service Transition" process for "Release and Deployment Management". The WBS includes all site preparation activities, e.g., new power, installation of equipment racks, and cabling. Activities to ensure documentation of standard operating procedures, planning for final security scans and any other activities required to transition operations to a "production" facility are also included in this WBS. Deployment activities for this WBS address both hardware and software or service/process deployment at either a single production facility or at multiple sites. This WBS would be used for activities to complete the approach for multi-site deployment.

**Element XXXXX.08 – Operational Site Implementations:** All activities required to implement (move into daily operation) at a specific site. The WBS would be used to track site resource requirements and scheduled site-specific activities for each site. Any site specific activities and resources would be tracked in this WBS. Examples of site specific activities would be the site readiness review, a data migration plan and a transition plan if migrating from one process/system to another.

**Element XXXXXX.09 – Outreach and Training:** All activities required to provide for the education and public outreach (EPO) responsibilities of NASA's IT projects in alignment with the Strategic Plan for Education. This WBS includes management and coordinated activities, formal education, informal education, public outreach, media support, and website development (if used for outreach activities). Includes all activities associated with designing, developing, and delivering training services, aids and materials for initial, attrition and refresher training of users as well as technical resources.

**Sample Expanded Project WBS using IT Standard WBS Elements**

The table provides a sample of a project using the IT Standard WBS Structure. IT Standard WBS elements that cannot be changed are notated in RED. The sample illustrates that additional level 2 WBS elements can be inserted between the range of standard elements. A project can add as many level 3, 4, 5, etc. elements as needed.

| **Level 1** | **Level 2** | **Level 3** | **Level 4** | **Level 5** | |
|---|---|---|---|---|---|
| **467983** | | | | | **WBS Illustration Project** |
| | **467983.01** | | | | **Project Management** |
| | | 467983.01.01 | | | **Project Management & Administration** |
| | | | 467983.01.01.01 | | FAD |
| | | | 467983.01.01.02 | | Project Plan |
| | | | 467983.01.01.03 | | Communications Plan |
| | | | 467983.01.01.04 | | Risk Plan |
| | | | 467983.01.01.05 | | Enterprise Architecture Plan |

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| | | | 467983.01.01.06 | | Project Management Reporting |
| | | | | 467983.01.01.06.01 | Monthly Metrics Reports |
| | | | | 467983.01.01.06.02 | Monthly/Quarterly Status Reports |
| | | 467983.01.02 | | | **Project Planning and Control** |
| | | | 467983.01.02.01 | | WBS Development and Control |
| | | | 467983.01.02.02 | | Project Schedule Management |
| | | | 467983.01.02.03 | | Business Management |
| | | 467983.01.03 | | | **Change Management** |
| | | 467983.01.04 | | | **Contract Management** |
| | | 467983.01.05 | | | **Project Reviews** |
| | | | 467983.01.05.01 | | SCR |
| | | | 467983.01.05.02 | | KDP A |
| | | | 467983.01.05.03 | | SRR |
| | | | 467983.01.05.04 | | EARP |
| | | | 467983.01.05.05 | | KDP B |
| | | | 467983.01.05.06 | | PDR |
| | | | 467983.01.05.07 | | NAR |
| | | | 467983.01.05.08 | | KDP C |
| | | | 467983.01.05.09 | | CDR |
| | | | 467983.01.05.10 | | KDP D |
| | | | 467983.01.05.11 | | TRR |
| | | | 467983.01.05.12 | | ORR |
| | | | 467983.01.05.13 | | KDP E |
| | | | 467983.01.05.14 | | PCR |
| | | 467983.01.06 | | | **Subcontractor Management** |
| | | 467983.01.07 | | | **Risk Management** |
| | **467983.02** | | | | **System Engineering** |
| | | 467983.02.01 | | | **Project Concept Development** |
| | | | 467983.02.01.01 | | ConOps |

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| | | | 467983.02.01.02 | | PCR |
| | | 467983.02.02 | | | **Requirements Development & Analysis** |
| | | | 467983.02.02.01 | | Requirements Specification |
| | | | 467983.02.02.02 | | System Architecture Development |
| | | | 467983.02.02.03 | | Verification & Validation Planning |
| | | | 467983.02.02.04 | | Interface Control |
| | | | 467983.02.02.05 | | Configuration Control |
| | **467983.03** | | | | **Safety and Mission Assurance** |
| | | 467983.03.01 | | | Safety and Compliance Activities |
| | | 467983.03.02 | | | Quality and Reliability |
| | **467983.04** | | | | **Systems/Modules Development** |
| | | 467983.04.01 | | | WBS Control Module (Example) |
| | | | 467983.04.01.01 | | Critical Design |
| | | | | 467983.04.01.01.01 | Critical Design Specification |
| | | | | 467983.04.01.02.02 | Critical Design Review |
| | | | 467983.04.01.02 | | Development |
| | | | 467983.04.01.03 | | Module Testing |
| | | | | 467983.04.01.03.01 | Unit Testing |
| | | | | 467983.04.01.03.02 | Subsystem Testing |
| | | | | 467983.04.01.03.03 | Module Testing |
| | | 467983.04.02 | | | WBS Tracking Repository Module (Example) |
| | | | 467983.04.02.01 | | Critical Design |
| | | | | 467983.04.02.01.01 | Critical Design Specification |
| | | | | 467983.04.02.01.02 | Critical Design Review |
| | | | 467983.04.02.02 | | Development |
| | | | 467983.04.02.03 | | Module Testing |
| | | | | 467983.04.02.03.01 | Unit Testing |
| | | | | 467983.04.02.03.02 | Subsystem Testing |

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| | | | | 467983.04.02.03.03 | Module Testing |
| | **467983.05** | | | | **System Integration, Verification & Validation** |
| | | 467983.05.01 | | | Test Facilities |
| | | 467983.05.02 | | | Test Procedures |
| | | 467983.05.03 | | | Personnel Prep & Certification |
| | | 467983.05.04 | | | System Integration |
| | | 467983.05.05 | | | Acceptance Test |
| | **467983.06** | | | | **Security Validation** |
| | | 46783.80.06.01 | | | Security Assessment |
| | | 46783.80.06.02 | | | Certification and Accreditation |
| | | 46783.80.06.03 | | | Security Scan |
| | **467983.07** | | | | **System Deployment** |
| | | 467983.07.01 | | | Change Package(s) |
| | | 467983. 07.02 | | | Backup/Contingency Plan |
| | | 467983. 07.03 | | | NATT/STRAW update |
| | | 467983. 07.04 | | | System Operations Plan |
| | | 467983. 07.05 | | | Operational Procedures |
| | **467983.08** | | | | **Operational Site Implementation** |
| | | 467983.08.01 | | | ARC |
| | | | 467983.08.01.01 | | Site Preparation |
| | | | 467983.08.01.02 | | Site Implementation Training |
| | | | 467983.08.01.03 | | Site Readiness Review |
| | | 467983. 08.02 | | | GSFC |
| | **467983.09** | | | | **Outreach and Training** |
| | | 467983.09.01 | | | Stakeholder Management & Communications |
| | | | 467983.09.01.01 | | Stakeholder Definition |
| | | | 467983.09.01.02 | | Stakeholder Analysis |
| | | | 467983.09.01.03 | | Communications Planning |

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| | | 467983.09.02 | | | Training |
| | | | 467983.09.02.01 | | Operations Training |
| | | | 467983.09.02.02 | | End User Training |
| | | 467983.09.03 | | | Outreach and Education Events |

# APPENDIX I Decision Memorandum Templates

## I.1 Program Decision Memorandum

### NASA IT Programs and Projects
### Decision Memorandum[2]

Summary: The Agency Information Technology (IT) Program Management Board (PMB) met on [Date] and evaluated the [XYZ] Program Key Decision Point [0/I/II/III/IV][3] of the life cycle as defined in NASA Procedural Requirement 7120.7: NASA Information Technology and Institutional Infrastructure Program and Project Management Requirements. [Briefly describe outcome, select the appropriate phrasing.]

**Decision: At KDP 0:** Based on this review and the program readiness, the Decision Authority for the [XYZ] Program [approves/disapproves] entry of this program into formulation consistent with the Formulation Authorization Document (FAD). This decision includes the actions specified below. [Provide or reference any additional direction and the documentation consistent with NPR 7120.7] Attach the FAD, along with supporting data for the cost and schedule information as applicable.

**Decision: At KDP [I,II,III,IV]:** Based on this review and the program readiness, the Decision Authority for the [XYZ] Program at KDP [I,II,III,IV] [approves/disapproves] entry of this program into Implementation consistent with the Program Commitment Agreement. This decision includes the actions specified below. [Provide or reference any additional direction and the documentation consistent with NPR 7120.7] Attach the PCA, along with supporting data for the cost and schedule information as applicable.

**Amendment:** Based on this review and the program readiness, the Decision Authority for the [XYZ] Program [approves/disapproves] amendment to KDP [I, II, III, IV] and continuation of the Program. This decision includes the actions specified below. [Provide any additional direction here and specify whether this direction is to be reflected in an updated PCA and/or program plan.] Attach the supporting document, along with supporting data for the cost and schedule information as applicable.

**Actions:** Include this section if there are any actions to report.

Action number: [Specify who has the action and the date or milestone for completion of the actions; include any additional direction on these actions].

[2] NASA CIO, as Decision Authority, approves program transition from KDP to next life cycle phase.
[3] Applicable for all program KPDs

| | | | |
|---|---|---|---|
| Program Director | Date | Program Manager | Date |
| Chair, IT PMB | Date | NASA CIO/DA | Date |

**I.2 Project Decision Memorandum**

## NASA [Project Name] KDP [A/B/C/D/E] Decision Memorandum

**Summary:** The Information Technology (IT) Program Management Board (PMB) met on [Date] and evaluated the [Project Name] Key Decision Point [A/B/C/D/E] of the life cycle as defined in NPR 7120.7, NASA Information Technology and Institutional Infrastructure Program and Project Management Requirements. [Briefly describe outcome.]

**Decision:** Based on this review and the project readiness, the Decision Authority for the [XYZ] project provides the following decision for KDP [A/B/C/D/E] with the content, schedule, and cost profile specified in the attached summary. This decision includes the actions specified below.

[Provide or reference any additional direction and the documentation of the Management Agreement consistent with NPR 7120.7] Attach a summary of the project content and acquisition strategy.

**Amendment:** Based on this review and the program readiness, the Decision Authority for the [Project Name] [approves/disapproves] amendment to KDP [A, B, C, D, E] and continuation of the project. This decision includes the actions specified below. [Provide any additional direction here and specify whether this direction is to be reflected in an updated PCA and/or project plan.] Attach the supporting document, along with supporting data for the cost and schedule information as applicable.

**Actions:** Include this section if there are any actions to report.
Action number: [Specify who has the action and the date or milestone for completion of the actions; include any additional direction on these actions].

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| Program Executive Date | Project Manager Date |
| Chair, IT PMB Date | NASA CIO/DA Date |