NASA Software Documentation Standard

Software Engineering Program

NASA-STD-2100-91

NASA

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National Aeronautics and
Space Administration
Washington, DC 20546

INTRODUCTION

The NASA Software Documentation Standard (hereinafter referred to as "Standard") is designed to support the documentation of all software developed for NASA; its goal is to provide a framework and model for recording the essential information needed throughout the development life cycle and maintenance of a software system. The Standard will have been successfully applied if the project manager (NASA) has tailored it to a minimum set and if the resulting documentation meets the following criteria:

       o   The documentation goals of the project are adequately satisfied.

       o   Clear descriptions of the software management, engineering, and assurance processes and products are provided.

       o   Consistency of format across the project documentation is achieved.

       o   Traceability to the untailored Standard is maintained.

       o   Traceability between products of each phase of the development life cycle is maintained.

The organizational philosophy of the Standard is straightforward. There are four main volumes of produced documentation: the Management Plan; Product Specification; Assurance and Test Procedures; and Management, Engineering, and Assurance Reports. All project planning information, including management, engineering, and assurance planning, is documented in the Management Plan. All technical engineering information is recorded in the Product Specification. All technical assurance information is placed in the Assurance and Test Procedures. All reports are kept in the Management, Engineering, and Assurance Reports.

The Standard provides a top-level Data Item Description (DID) for a documentation set and a DID for each volume that consist of a table of contents (format) along with requirements for what is to be addressed in each section (content). If needed, the base table of contents can be given greater substructure through the use of additional DIDs. DIDs may be modified so that sections that are not applicable are marked N/A and not used, and additional needed sections are added through tailoring. Volumes may be produced either in the same top-level document or in separate documents.

The major sections of the Standard are as follows: Section 1.0 provides purpose, scope, and application of the Standard; Section 2.0 includes references, abbreviations, acronyms, and glossary. All requirements found in the Standard are contained in Section 3.0, with general requirements in Section 3.1, specific requirements for tailoring the Standard in Section 3.2, and requirements and rules for creating documentation based on the tailored Standard in Section 3.3. Section 4.0, Quality Assurance Provisions, addresses assurance and enforcement of the Standard. Section 5.0, Packaging, does not apply to the Standard and is therefore not applicable. Section 6.0 contains additional useful information, including explanations and examples. Appendix A contains a tailoring checklist consisting of a single outline, using all the Data Item Descriptions (DIDs). Appendix B contains the two master DIDs for creating documentation: the top-level DID whose four

sections are the four volumes (Software Documentation Set DID) and a DID used for creating separate documents while maintaining traceability (Template DID). Appendices C, D, E, and F contain, respectively, the DIDs for the Management Plan; Product Specification; Assurance and Test Procedures; and Management, Engineering, and Assurance Reports.

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1.0   SCOPE, PURPOSE, AND APPLICATION

1.1   SCOPE

The NASA Software Documentation Standard (hereinafter referred to as Standard) can be applied to the documentation of all NASA software. This Standard is limited to documentation format and content requirements. It does not mandate specific management, engineering, or assurance standards or techniques.

1.2   PURPOSE

This Standard defines the format and content of documentation for software acquisition, development, and sustaining engineering. Format requirements address where information shall be recorded and content requirements address what information shall be recorded.

This Standard provides a framework to allow consistency of documentation across NASA and visibility into the completeness of project documentation. This basic framework consists of four major sections (or volumes). The Management Plan contains all planning and business aspects of a software project, including engineering and assurance planning. The Product Specification contains all technical engineering information, including software requirements and design. The Assurance and Test Procedures contains all technical assurance information, including Test, Quality Assurance (QA), and Verification and Validation (V&V). The Management, Engineering, and Assurance Reports is the library and/or listing of all project reports.

1.3   APPLICATION

Selection and use of this Standard is the responsibility of program/project management and is to be determined on a program/project basis.

2.0 REFERENCES

2.1 REFERENCED DOCUMENTS

IEEE Standard Glossary of Software Engineering Terminology. ANSI/IEEE Standard 729-1983. New York: Institute of Electrical and Electronic Engineers, Inc.

Military Standard for Defense System Software Development, DoD-STD-2167, 4 June 1985, and DoD-STD-2167A, 27 October 1987.

NASA Software Management, Assurance, and Engineering Policy, NMI 2410.10, March 26, 1991.

2.2 ABBREVIATIONS AND ACRONYMS

AR   -   Acceptance Review
CDR   -   Critical Design Review
COTS -   Commercial Off-The-Shelf
CSC   -   Computer Software Component
CSCI   -   Computer Software Configuration Item
CSU   -   Computer Software Unit
DID   -   Data Item Description
DoD   -   Department of Defense
ECP   -   Engineering Change Proposal
FCA   -   Functional Configuration Audit
GFE   -   Government-Furnished Equipment
IV&V -   Independent Verification and Validation
N/A   -   Not Applicable
NASA -   National Aeronautics and Space Administration
NRCA -   Nonconformance Reporting and Corrective Action
PCA   -   Physical Configuration Audit
PDR   -   Preliminary Design Review
QA   -   Quality Assurance
RFP   -   Request for Proposal
RR   -   Requirements Review
SOW   -   Statement of Work
SRM&QA-   Safety, Reliability, Maintainability, and Quality Assurance
STD   -   Standard
TBD   -   To Be Determined (at a later date)
TRR   -   Test Readiness Review
V&V   -   Verification and Validation
WBS   -   Work Breakdown Structure

2.3   GLOSSARY

For terms not appearing in this glossary, refer to the IEEE Standard Glossary (as referenced in Section 2.1).

Acceptance Review (AR) - The phase transition review for the Acceptance and Delivery life cycle phase.

Acquirer - An organization that obtains a capability, such as a software system.

Adaptation - The tailoring of the documentation standards (within the specifications of the rules and guidelines) for a specific program, project, or software system.

Assurance - Those activities, independent of the organization conducting the activity, that demonstrate the conformance of a product or process to a specified criteria (such as a design or a standard).

Assurance and Test Procedures - One of four logical volumes in a documentation set; it encompasses all the technical (i.e., nonplanning) aspects of the assurance activities.

Baselining - The official acceptance of a product or its placement under configuration management as defined in the Management Plan.

Certification - The process of confirming that a system, software subsystem, or computer program is capable of satisfying its specified requirements in an operational environment. Certification usually takes place in the field under actual conditions, and is used to evaluate not only the software itself, but also the specifications to which the software was constructed. Certification extends the process of verification and validation to an actual or simulated operational environment.

Computer Software Component (CSC) - A functional or logically distinct part of a computer software configuration item. Computer software components may be top-level or lower level.

Computer Software Configuration Item (CSCI) - A collection of software elements treated as a unit for the purpose of configuration management.

Computer Software Unit (CSU) - The smallest logical entity specified in the design of a computer software component and the actual physical entity in code that implements a testable aspect of the requirements. This is the smallest unit for which documentation may be required.

Critical Design Review (CDR) - The phase transition review for the Detailed Design life cycle phase.

Data Item Description (DID) - The table of contents and associated content description of a document or volume.

Developer - The provider organization responsible for development of software.

Document - A physically separate book in a documentation set.

Documentation Set - The four logical volumes for a software system. These volumes are the Management Plan; Product Specification; Assurance and Test Procedures; and Management, Engineering, and Assurance Reports.

Evolutionary Acquisition - The acquisition of software over a relatively long period of time in which two or more complete iterations of a life cycle will be employed to revise and extend the system to such an extent as to require a major requirements analysis and therefore subsequent life cycle iterations.

Firmware - Hardware that contains a computer program and data that cannot be changed in its user environment. The computer programs and data contained in the firmware are classified as software; the circuitry containing the computer program and data is classified as hardware.

Functional Configuration Audit (FCA) - The formal examination of functional characteristics' test data for a computer software configuration item, prior to acceptance, to verify that the item has achieved the performance specified in its functional or allocated configuration identification.

Hardware - Physical equipment used in data processing, as opposed to computer programs, procedures, rules, and associated documentation.

Increment - A predefined set of units integrated for integration testing by the development organization in response to incremental development plans.

Incremental Development - The process of developing a product before delivery in a series of segments. These segments remain internal to the development organization. The process is used to help minimize risk. The segments are defined based on the design and documented in the Design section of the Product Specification. The process leads to a single delivery unless used in conjunction with "phased delivery."

Independent Verification and Validation (IV&V) - Verification and validation performed by an organization independent of the development organization. For complete independence, the IV&V organization reports directly to and is funded directly by the acquirer.

Life Cycle (software) - The period of time that starts when a software product is conceived and ends when the software is no longer available for use. The software life cycle traditionally has eight phases: Concept and Initiation; Requirements; Architectural Design; Detailed Design; Implementation/Coordination; Integration and Test; Acceptance and Delivery; and Sustaining Engineering and Operations. This example is referred to as the waterfall life cycle.

Management, Engineering, and Assurance Reports - One of four logical volumes in the documentation set; it represents a "logical" home for all reports and request forms.

Management Plan - One of four logical volumes in a documentation set; it encompasses all planning information, including management, engineering, and assurance planning.

Metric - Quantitative measure of extent or degree to which software possesses and exhibits a certain characteristic, quality, property, or attribute.

Partitioning - The process of determining the content for each delivery when using the phased delivery approach, or for determining the content of each segment when using incremental development.

Phase - The period of time during the life of a project in which a related set of software engineering activities are performed. Phases may overlap.

Phase Transition Review - The review at the end of a phase triggering transition to the next phase.

Phased Delivery - The process of developing and delivering a product in stages, each providing an increasing capability for the software. The process may be employed to provide an early operational capability to users, for budgetary reasons, or because of risk, size, or complexity. Each delivery should undergo acceptance testing prior to release for operational use. The capabilities provided in each delivery are determined by prioritizing and partitioning the requirements. This is to be documented in the Requirements section of the Product Specification.

Physical Configuration Audit (PCA) - The formal examination of the "as-built" configuration of a unit of a computer software configuration item against its technical documentation in order to establish the computer software configuration item's initial product configuration identification.

Preliminary Design Review (PDR) - The phase transition review for the Architectural Design life cycle phase.

Product Specification - One of four logical volumes in a documentation set; it encompasses all the technical engineering information related to the development of the software.

Prototyping - A process used to explore alternatives and minimize risks. Prototyping can be used in any life cycle phase. The product of the process is usually a report.

Provider - An organization providing a capability to an acquirer; e.g., the developer or an organization providing IV&V.

Quality Assurance (QA) - A subset of the total assurance activities generally focused on conformance to standards and plans.

Quality Engineering - The process of incorporating reliability, maintainability, and other quality factors into software products.

Repository - A collection of standards, procedures, guides, practices, rules, etc., that supplements information contained in a documentation set. In general, the documentation set describes "what" is to be done and the repository provides the "how to" instructions. A repository usually contains information that is applicable to multiple software systems.

Requirements Allocation - The process of distributing requirements of a software system to subordinate software subsystems or lower level elements.

Requirements Partitioning - The process of distributing requirements of software to different deliveries in support of phased delivery.

Requirements Review (RR) - The phase transition review for the Requirements life cycle phase.

Review Item Discrepancy - A type of discrepancy report used when reviewing documentation.

Risk - The combined effect of the likelihood of an unfavorable occurrence and the potential impact of that occurrence.

Risk Management - The process of assessing potential risks and reducing those risks within budget, schedule, and other constraints.

Roll-out - A mechanism for recording sections of a volume in physically separate documents while maintaining traceability and links to the parent document.

Software - Programs, procedures, rules, and any associated documentation and data pertaining to the operation of a computer system, including programs and data contained in firmware.

Template DID - Framework used in the roll-out process for defining the specific format of a section rolled-out into a physically separate document.

Test Readiness Review (TRR) - The phase transition review for the Integration and Test life cycle phase.

Testing - The process of exercising or evaluating software by manual or automated means to demonstrate that it satisfies specified requirements or to identify differences between expected and actual results.

Tool - A hardware device or computer program used to help develop, test, analyze, or maintain another device or computer program or its documentation.

Unit - see Computer Software Unit.

Verification and Validation - The process of evaluating software to ensure compliance with requirements and determining whether or not the products of a given phase of development fulfill the requirements established during the previous phase.

Volume - One of the four basic types of information to be addressed for each software acquisition/development activity. The four volumes are the Management Plan; Product Specification; Assurance and Test Procedures; and Management, Engineering, and Assurance Reports.

3.0   REQUIREMENTS

This section contains all requirements for implementing the Standard, tailoring the DIDs, and producing the documentation. Section 3.1, Implementation Requirements, contains requirements for designing the overall structure of the project documentation. Section 3.2, Tailoring Requirements, contains requirements for tailoring the DIDs. Section 3.3, Documentation Requirements, contains content and structure requirements for producing documentation.

3.1   IMPLEMENTATION REQUIREMENTS

3.1.1   All delivered project documentation shall be produced in accordance with this Standard.

3.1.2   The project manager shall develop a documentation tree, or trees, as dictated by the structure of the project.

3.1.3   Each documentation tree shall address all four major sections (or volumes) of the Standard.

   a.   Management Plan
   b.   Product Specification
   c.   Assurance and Test Procedures
   d.   Management, Engineering, and Assurance Reports

3.1.4   The documentation tree shall contain at least one instance of each of these volumes.

3.1.5   This documentation tree (text or graphic) shall be placed in Section 1.5, Documentation Organization, of each document belonging to the tree.

3.1.6   The creation of documentation shall be accomplished by using the DIDs (as tailored) contained in Appendices B through F of this Standard.

3.1.7   For development and/or acquisitions of software having the highest classification (per NMI 2410.10), Sections 5.0 and 6.0 of the Acquisition Activities Plan section of the Management Plan shall be completed without tailoring.

3.2   TAILORING REQUIREMENTS

A certain amount of tailoring is expected on every software acquisition or development project. The main purpose of tailoring is to achieve a balance between software documentation needs and cost. The project manager should not apply a requirement or ask for a piece of documentation if it is not needed for the project's success. The project

manager should consider the special risks, needs, and limitations of a specific software project, and then tailor the DIDs accordingly.

Tailoring of this Standard consists of the following: a) evaluating individual sections of the DIDs to determine the extent to which the documentation called for is needed in a specific application; and b) modifying the DIDs by adding new sections, identifying sections that are not applicable (N/A), or changing text within sections in order to clarify the intent of that section.

The complete table of contents for a documentation set is included in Appendix A. This table of contents can serve as a detailed tailoring checklist.

3.2.1   The project manager, in conjunction with the product assurance manager, shall tailor the DIDs to a specific software acquisition or development activity before levying this Standard on that activity.

3.2.2   For all documentation, the project manager shall determine which sections and subsections are applicable, and each section and subsection determined to be not applicable to the project shall be marked "N/A."

3.2.3   If all subsections of a given section are not applicable or if the information expected from these subsections can be provided in a short unfragmented form, then the subsections shall be removed from the tailored standard, while keeping the section.

3.2.4   When information is desired, but no logical subsection exists in the original DID, the project manager shall add new subsections to the DID at the end of the appropriate section, after all original subsections.

3.2.5   When any subsections are used within a section, all other original subsections shall be listed, even if they are marked N/A.

3.2.6   The project manager shall modify the text in a subsection if that is needed for clarity or completeness without any change to intended purpose of the section.

3.3   DOCUMENTATION REQUIREMENTS

The DIDs describe the format and contents for each section of the documentation set. Additionally, some sections of a DID specify the use of a lower level DID to prepare that particular section. This lower level DID contains the subsections and their format and content descriptions.

3.3.1   Project documentation shall be created using the DIDs, as tailored by the project manager, without reordering or renumbering.

3.3.2   All documents shall follow the section numbering and content description found in the tailored DIDs.

3.3.3   Each section and subsection shall contain one of six entries:

   a.   Information (text or graphics pertaining to the section).
   b.   TBD, if the information is not ready.
   c.   N/A and the rationale for marking the section N/A.
   d.   A pointer to a section of a document in the project's documentation produced using this Standard. This type of pointer should be used when a more general description of the item to be documented is already called for elsewhere and that section is sufficient for the needs of the section doing the pointing. Typically, this involves pointing from a section in one DID to a section in another DID.
   e.   A pointer to a section of a document NOT produced using the Standard. This type of pointer should be used if the section is to be produced using a format other than that specified in this Standard. A pointer of this type shall direct the reader to the exact location of the needed information. There must be a separate pointer for each section and subsection in the tailored DIDs. The sectioning found in the tailored DIDs must be maintained in the produced documentation to ensure traceability to the tailored DIDs and to ensure uniformity in the application of the Standard. For documents that will be produced multiple times (for example, multiple Product Specifications), a one-time mapping should be produced for that type of document and included in the introductory material of that document.
   f.   A pointer to a rolled-out document (as described in Section 3.3.8).

3.3.4   If a particular class of document (for example, Test Procedures) is to be produced in a format different from that given in the DIDs, the project manager shall produce a detailed mapping that indicates precisely where each piece of information called for in the DIDs may be found. This mapping shall then be included once in Section 1.5, Documentation Organization, of the Management Plan.

3.3.5   All new sections created shall only contain information that cannot appropriately be placed anywhere else in the tailored DIDs.

3.3.6   Each document shall contain a list (in the form of a table of contents) in Section 1.5, Documentation Organization, that shows which sections and subsections have been:

   a.   Marked N/A
   b.   Added
   c.   Marked with a pointer

NOTE: Appendix A contains a complete Table of Contents for a documentation set.

3.3.7   All documents shall contain the DID number of the highest level DID used to produce that document. This number should be placed either on the cover or in the Applicable Documents Section.

3.3.8   Roll-out

Roll-out is a mechanism for recording sections of one document in physically separate documents while maintaining traceability. Roll-out is to be used if the project manager needs to break up a document into multiple documents.

Some factors influencing a decision in favor of roll-out include:

a.   When the activities to be accomplished are delegated to another organization, whether internal or external.
b.   When the detail occasioned by the complexity of the activities to be accomplished is too great to be described within a single physical document.
c.   When it is desirable to apply configuration management and control to the section separately from other sections because of amount of change expected, time required to review before baselining, etc.

3.3.8.1 A rolled-out document shall include every section and subsection contents and format from the point exited from its parent document.

3.3.8.2 A rolled-out document shall contain introductory and supplemental sections specified in DID-999 Template DID.

3.3.8.3 Each rolled-out document shall be titled as illustrated below. This method supports the Standard and enables the document to be placed in context with its parent document(s).

< title of the rolled-out section >
of the
[< parent document title >
of the]
< documentation set parent title >

Note that the document entry in brackets ([]) is to be expanded zero or more times depending on the number of levels of roll-out from the documentation set parent. Additional information may be included on the title page as specified by delivery requirements.

4.0   QUALITY ASSURANCE PROVISIONS

The program/project manager is responsible for assuring and enforcing this Standard in the following ways:

a.   Emphasizing correct enforcement and interpretation of this Standard as the documentation is being prepared.

b.   Evaluating use of the Standard during the phase transition reviews indicated by the life cycle.

c.   Initiating activities specifically to assure documentation is prepared according to the Standard, such as reviews or audits. These activities should be explicitly called out in the Assurance Plan section of the Management Plan.

It is the responsibility of any reviewer to be familiar with the particular aspects of this Standard that are applicable to the products or processes under review and to question any deviations. In particular, a reviewer should ensure:

a.   A tailoring checklist has been prepared and is included in the documentation.

b.   Documentation trees are produced and included in the documentation.

c.   The documentation follows the tailored standard in format and content.

d.   The use of roll-out is properly applied.

The detailed outline and contents specifications for documentation can be used by reviewers as a gross level checklist.

5.0 PACKAGING

Not Applicable. There are no packaging requirements associated with this Standard.

6.0   ADDITIONAL INFORMATION

THIS SECTION CONTAINS NO REQUIREMENTS.

This section provides additional information and examples for certain elements of the Standard. The examples are given as the most likely interpretation of the requirements given in the Standard, but are not exclusive.
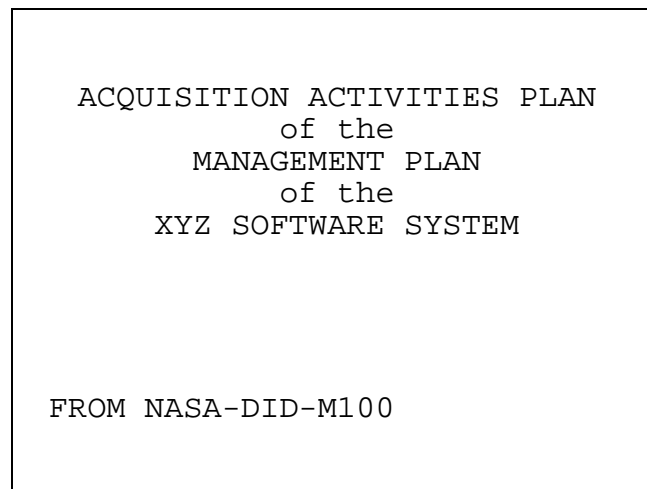
6.1   RELATIONSHIP BETWEEN ACQUIRER AND PROVIDER

The Standard defines two types of organizations, acquirers and providers. The acquirer is the organization that is purchasing the software, product, or associated service. In most cases, the acquirer is NASA or an organization within NASA. The provider is the organization that is delivering that product or service. This can be a contractor, a separate NASA organization, or, in some cases, the acquirer and provider are the same organization. A provider may provide software, IV&V, subcontractor support, consulting, etc. A provider is ultimately responsible for providing something to the acquirer in accordance with the acquirer's requirements.

If the acquirer of a software system is NASA and the provider is a contractor, a typical scenario of how the acquirer and provider documents would be produced is as follows. The acquirer determines that a software system is needed, and creates a Management Plan (in particular, an Acquisition Plan) for that software. The acquirer then creates an RFP and SOW based on this plan. The provider winning the contract will produce a Management Plan based on the SOW, and a Product Specification, Assurance and Test Procedures, and Management, Engineering, and Assurance Reports based on that Management Plan. The acquirer will continue documentation in its Management Plan, and will create Assurance and Test Procedures and Management, Engineering, and Assurance Reports for the acquirer's activities.

6.2   DOCUMENT TITLES

The following is an example of a cover page for a document when complying with requirements 3.3.7 and 3.3.8.3. Assuming that this is a rolled-out Acquisition Activities Plan section of a Management Plan, the cover would contain the following information:

```
        ACQUISITION ACTIVITIES PLAN
                 of the
            MANAGEMENT PLAN
                 of the
          XYZ SOFTWARE SYSTEM




     FROM NASA-DID-M100
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The DID number in the lower left-hand corner is the DID number of the highest level DID used to produce this document; in this case, NASA-DID-M100, Acquisition Activities Plan.

6.3   TAILORING CHECKLIST

Appendix A contains a detailed outline (in the form of a table of contents) of every section and subsection comprising the Management Plan; Product Specification; Assurance and Test Procedures; and the Management, Engineering, and Assurance Reports. This list may be a useful aid to the person tailoring the Standard. To use the list, simply go down the list and check off every section and subsection as applicable or nonapplicable. Once this is done, go through the list again and check off any sections that will contain pointers, either due to roll-out or because the information is found somewhere else. Once this is completed, this list is placed in Section 1.5, Documentation Organization, of each document produced in order to satisfy requirement 3.3.6.

APPENDIX A

DOCUMENTATION SET OUTLINE AND CHECKLIST

This appendix contains a detailed outline, in the form of a table of contents, for the entire documentation set. This outline also may be used by the project manager as a checklist for tailoring the DIDs to the needs of the project. When used as a checklist, the rules for tailoring provided in Section 3.2 of the Standard must be followed. The completed (tailored) checklist may then be used to decide which DIDs (or portions of DIDs) will be used to produce required documentation.

Section

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3.3.3.3	Management Mechanisms
3.3.3.3.1	Requirements Development and Control
3.3.3.3.2	Schedule Development and Control
3.3.3.3.3	Resource Development and Control
3.3.3.3.4	Internal Review Concepts
3.3.3.3.5	External Review Concepts
3.3.3.3.6	Board Support
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3.4.2.2	Product Specification Roll-Out Definition

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4.6.1.2   Installation and Initialization
4.6.1.3   Startup and Termination
4.6.1.4   Functions and their Operation
4.6.1.5   Error and Warning Messages
4.6.1.6   Recovery Steps
4.6.2   User's Training Materials

4.7   Operational Procedures Manual
4.7.1   System Preparation and Set-up Procedures
4.7.2   Standard Operating Procedures
4.7.3   Fault and Recovery Procedures
4.7.4   Emergency Procedures
4.7.5   Diagnostic Procedures

4.8   Maintenance Manual
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4.8.2   Modification Aids
4.8.3   Code Adaptation

5.0   ASSURANCE AND TEST PROCEDURES
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5.2   Verification and Validation
5.2.1   Inspections, Reviews, and Analyses
5.2.2   Testing
5.2.2.1   Unit Testing
5.2.2.2   Integration Testing
5.2.2.3   Acceptance Testing

5.3   Quality Engineering Assurance
5.4   Safety Assurance
5.5   Security and Privacy Assurance
5.6   Certification

6.0   MANAGEMENT, ENGINEERING, AND ASSURANCE REPORTS
         NASA-DID-R001   Certification Report
         NASA-DID-R002   Audit Report
         NASA-DID-R003   Inspection Report
         NASA-DID-R004   Discrepancy (NRCA) Report
         NASA-DID-R005   Engineering Change Proposal
         NASA-DID-R006   Lessons Learned Report
         NASA-DID-R007   Performance/Status Reports
         NASA-DID-R008   Assurance Activity Report

NASA-DID-R009   Test Report
NASA-DID-R010   Waiver/Deviation Request
NASA-DID-R011   Review Report

7.0   ABBREVIATIONS AND ACRONYMS

8.0   GLOSSARY

9.0   NOTES

10.0   APPENDICES

APPENDIX B

MASTER DOCUMENTATION DATA ITEM DESCRIPTIONS

This appendix contains specifications for the format, outline, and content of the Software Documentation Set DID and the Template DID. These two DIDs are used as support structures for project documentation.

The Software Documentation Set DID (NASA-DID-000) provides a top-level reference for the four required volumes of a documentation set. The four volumes may be contained in the documentation set created using this DID or rolled-out into separate documents with references to this top-level document.

The Template DID (NASA-DID-999) provides the format and content for both the front matter (Introduction, Related Documents) and back matter (Abbreviations and Acronyms, Glossary, Notes, Appendices) to be contained in all separate documents. It also provides detailed instructions for preparing documents that are rolled out. Note that this DID does not represent a particular separate document, but is used to generate the format for sections that are to be contained in physically separate documents.

Table B-1. DID Index

NASA-DID-000
SOFTWARE DOCUMENTATION SET
DATA ITEM DESCRIPTION

<u>TABLE OF CONTENTS</u>

Section

EXPLANATORY NOTE

The purpose of the Software Documentation Set DID is to provide a top-level
document for the four volumes of the documentation set. Any or all of the four
volumes may be contained in this document. Those volumes that are not contained
in this document are referenced in this document.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of
this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of
this section.

3.0   MANAGEMENT PLAN

Refer to NASA-DID-M000 for Management Plan format and content.

4.0   PRODUCT SPECIFICATION

Refer to NASA-DID-P000 for Product Specification format and content.

5.0   ASSURANCE AND TEST PROCEDURES

Refer to NASA-DID-A000 for Assurance and Test Procedures format and content.

6.0   MANAGEMENT, ENGINEERING, AND ASSURANCE REPORTS

Refer to NASA-DID-R000 for Management, Engineering, and Assurance Reports format and content.

7.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed content description of this section.

8.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed content description of this section.

9.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed content description of this section.

10.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed content description of this section.

NASA-DID-999
TEMPLATE
DATA ITEM DESCRIPTION

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Section

EXPLANATORY NOTE

The purpose of the template is to describe the set of common sections that are to appear in the document specified by the Standard and in any rolled-out documents. When using this template for the volume itself rather than for a rolled-out document, the word "Volume" should be used in place of "Document" in the following section descriptions.

1.0   INTRODUCTION

1.1   Identification of Document

Identify this physical document in terms of its relationship to the parent volume(s) in this documentation set. For documentation set volumes, identify the parent(s) in the decomposition tree for the software system. For example:

> "This is the Management Plan of the XYZ Software System."
> "This is the Concept Document of the Product Specification of the XYZ Software System."
> "This is the Input/Output Unit Test Procedures of the Assurance and Test Procedures of the XYZ Software System."

1.2   Scope of Document

Describe the area of cognizance, responsibility, and applicability for this document.

1.3   Purpose and Objectives of Document

Describe the purpose and objectives for this document concisely and in specific terms.

1.4   Document Status and Schedule

Describe the status, including goals and dates, for production or revision of the document. Documentation is often generated incrementally or iteratively. If this is the case for this document, also summarize here the planned updates and their release dates.

1.5   Documentation Organization

Briefly describe the contents of each major section within this document and the contents of each appendix.

Provide a documentation tree (text or graphic) of all documents produced for the project showing the relationship between the documents, and where this document fits in that tree.

Include a list, in the form of a table of contents, which shows for this document which sections and subsections of the standard have been:

> a.   Marked N/A
> b.   Added
> c.   Marked with a pointer

2.0   RELATED DOCUMENTATION

The purpose of this section is to provide the references or bibliography for this document.

Cite documents by short or common title (if any), full title, version or release designator (if appropriate), date, publisher or source, and document number or other unique identifier.

2.1   Parent Documents

Begin this section as follows, depending upon whether this is a rolled out document or a top-level document:

> "The following document(s) is (are) parent to this document:"

> > or:

> "The following volume(s) is (are) the parent from which this document's scope and content are derived:"

(For top-level documents, any parent documents will be outside the documentation set.)

If the document is for a lower level element, cite the appropriate document at the next higher level. For example, a Management Plan would cite the Management Plan for the next higher level software system, or the Product Specification would cite the Management Plan and the parent's Product Specification. If there is no higher level, state "None."

If this is a rolled-out document, cite the parent document. If this is a rolled-out document from another rolled-out document, cite each document in the hierarchical path back to the parent document, starting with the document immediately superior to this one.

2.2   Applicable Documents

Provide the citations for every document (other than the parent) referenced within this volume, or which are directly applicable, or contain policies or other directive matters that are binding upon the content of this volume. Also include the DID number of the highest level DID and, if appropriate, section number, used to prepare this document.

2.3   Information Documents

Provide the citations for documents which, although not directly applicable, amplify or clarify the information presented in this volume. State if these are not binding, or indicate the relationship of the documents listed here to this document.

3.0 - N.0   CONTENT FOR ROLLED-OUT SECTION

Each major subsection of the section of the volume, or of a rolled-out document thereof, being rolled-out into a separate subordinate volume becomes a major section in the rolled-out volume.

N+1.0 ABBREVIATIONS AND ACRONYMS

This section follows the sections containing the content for the rolled-out section.

The abbreviations and acronyms section contains an alphabetized list of the definitions for abbreviations and acronyms used in this document.

N+2.0 GLOSSARY

The glossary contains an alphabetized list of definitions for special terms used in the document, i.e., terms used in a sense that differs from or is more specific than the common usage for such terms.

N+3.0 NOTES

Use this section to present information that aids in understanding the information provided in previous sections, and which is not contractually binding.

N+4.0 APPENDICES

The appendices contain material that is too bulky, detailed, or sensitive to be placed in the main body of text. Refer to each appendix in the main body of the text where the information applies. Appendices may be bound separately, but are considered to be part of the document and shall be placed under configuration control as such.

APPENDIX C

MANAGEMENT PLAN DATA ITEM DESCRIPTIONS

This appendix contains the specifications for the format, outline, and content of the Management Plan and rolled-out sections. Major sections of the Management Plan have been rolled-out into separate Data Item Descriptions (DIDs) using Template DID (NASA-DID-999) for purposes of clarity and manageability.

The Management Plan DIDs provide outlines for the complete Management Plan documents. Major sections of the Management Plan point to lower level DIDs that contain more detailed content descriptions of these major sections.

The number of Management Plan documents generated does not have to reflect the number of DIDs presented in this section. Lower-level detailed DIDs provide additional substructure and contain content discussion which should be reviewed even when the content is recorded in-line (i.e., not rolled-out).

The detailed DIDs in this appendix may be used as they stand to produce separate documents of the Management Plan.

Table C-1. Management Plan DIDs (Numeric Order)

Table C-2. Complete DID Set for a Management Plan

NASA-DID-M000   Management Plan
    NASA-DID-M100   Acquisition Activities Plan
    NASA-DID-M200   Development Activities Plan
        NASA-DID-M210   Training Development Plan
    NASA-DID-M300   Sustaining Engineering and Operations Activities Plan
    NASA-DID-M400   Assurance Plan
    NASA-DID-M500   Risk Management Plan
    NASA-DID-M600   Configuration Management Plan
    NASA-DID-M700   Delivery and Operational Transition Plan

NASA-DID-M000
MANAGEMENT PLAN
DATA ITEM DESCRIPTION

TABLE OF CONTENTS

EXPLANATORY NOTE

The purpose of the Management Plan is to provide the organization for all planning information. It includes planning for management, assurance, and development for all life cycle phases for the software, including sustaining engineering.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   PURPOSE AND DESCRIPTION OF <THE SOFTWARE>

Describe the purpose, scope, and major functions of the software being acquired by the organization preparing this plan. Describe in terms that provide a background for understanding the objectives for the management planning information presented in this document. If appropriate, reference sections of the Product Specification for additional detail. Include a system decomposition tree for the entire software system which clearly shows all CSCIs, CSCs, and CSUs and their relationships.

4.0   RESOURCES, BUDGETS, SCHEDULES, AND ORGANIZATION

The purpose of this section is to describe the business aspects of the software acquisition and/or development. In some cases, all of the material that belongs in this section is detailed in the contract. In such cases, this section should contain pointers to the appropriate sections of the contract.

4.1   Business Practices Definition and Revision Process

4.1.1   Definition of Activities

Define the practices, tasks, and activities to be accomplished as the basis for budgeting, scheduling, etc.

4.1.2   Method and Approach

Describe the method and approach for the business practices to be employed in managing the activities that are the subject of this plan. For example:

    a.   Determining measurable cost projections
    b.   Determining feasible schedule projections
    c.   Analyzing possible impacts of proposed changes
    d.   Analyzing cost effectiveness
    e.   Determining overhead (indirect cost) rates and allocation
    f.   Schedule performance

4.1.3   Reporting, Monitoring, and Revision

List the status, performance, review, change request, lessons learned, etc., reports to be used for monitoring and controlling the activities that are the subject of this plan and specify for each report:

    a.   Purpose
    b.   Summary of content
    c.   Who is responsible for generation

      d.   Schedule of submission
      e.   Distribution
      f.   Access restrictions
      g.   Analysis to be performed on report data
      h.   Retention period
      i.   Retention location

Procedures governing the preparation, routing, storage, modification, etc., of reports are included in the repository of procedures, guides, practices, etc., that supplement the software documentation set. The reports themselves are included in, or tracked by, the Management, Engineering, and Assurance Reports.

Describe the monitoring process to identify and react to:

      a.   Problems that require management attention
      b.   Variances in actual versus planned cost performance
      c.   Variances in labor, overhead, and other rates on which budget and actual costs are based
      d.   Variances in actual versus planned schedule performance
      e.   Variances in specified versus actual product quality, including documentation
      f.   Other significant differences between actual and planned performance

Describe the revision process including analysis of the effects of both authorized changes and replanning actions on technical performance, schedules, or cost. Also describe the process for obtaining authorized changes and for revising budgets and schedules.

Explicitly prohibit retroactive changes to records pertaining to work performed that will change previously reported amounts for direct costs, indirect costs, and budgets, except for normal accounting adjustments.

Specify cost control measures to be employed, and describe how costs are to be monitored.

4.2   Work Breakdown Structure

Describe the logical structure for managing acquisition and development (or relevant section thereof) by means of a Work Breakdown Structure (WBS) scheme that is coordinated with the resource allocation described in Section 4.3. An activities-oriented rather than an organization- or product-oriented WBS is recommended. The level of detail given in the WBS should be sufficient to support sound management practices. Further, it may be appropriate for the WBS to be placed in a management planning system and a pointer to that information given in this section.

4.2.1   Activity Definition

For purposes of the WBS, identify the activities to be undertaken. Define these in terms of a descriptive statement in operational terms of activities and identification of the products to be delivered.

Describe the WBS in terms of:

      a.   A hierarchical structure for controlling the sequences and interdependencies of key activities and responsibilities.
      b.   Setting objectives and ground rules.
      c.   Relating activities to products.

The number of WBS levels required is a function of such factors as:

      a.   Size of effort
      b.   Volume of activity
      c.   Cost account structure
      d.   Number of personnel engaged in a WBS activity
      e.   Task duration and schedule
      f.   Number of milestones in each task
      g.   Implementation cost
      h.   Risk assessment

4.2.2   Cost Account Definition

Identify and define the cost accounts to be associated with the WBS and its structure. For example, a cost account may be established for each level in the WBS and for each cost category such as direct labor, material, and indirect costs.

Describe cost accounting methods to be used in such terms as:

      a.   Cost centers
      b.   Performance control systems
      c.   Calculation of budgeted cost of work scheduled
      d.   Calculation for budgeted cost of work performed
      e.   Analysis of variance

4.3   Resource Estimation and Allocation to WBS

The purpose of this section is to list and describe the resources available to support the activities defined in the WBS. The resources may include funds, personnel, facilities, government-furnished equipment (GFE), reusable software libraries, etc.

4.3.1   Schedules

Present the schedules on which performance and resource planning are based. Depending upon the scope and complexity of the activities that are the subject of the plan, schedules may be presented at several levels: a master schedule, intermediate level schedules, and detailed schedules. It may be appropriate to place schedule information in a management planning system and a pointer to that information given in this section. Note that all schedule information should be included in this section only.

Schedules are normally based on the accomplishment of identified milestones. Milestones frequently mark transition points at which a product is passed from one activity to another. Supplement major milestones with intermediate ones to provide frequent points at which progress can be assessed. Identify milestones in terms of a product or measurable event, a date, and a brief description.

Describe the master schedule in terms of:

    a.   Specific activities
    b.   Organizations affected
    c.   Specific milestones and deliverables
    d.   Delivery dates for acquired products and services

Describe subordinate schedules to be developed by performing organizations if their plans are incorporated within this document. Detailed subordinate schedules may be integrated into intermediate-level schedules and finally into the master schedule. Prepare subordinate schedules for each activity being managed.

Scheduling detail includes:

    a.   Major and intermediate milestones (usually marking the delivery of products from one organization to another)
    b.   Unique units of work
    c.   Start and completion dates
    d.   Responsibility for performing the work
    e.   Integration with detailed engineering, coding, and other schedules as applicable
    f.   Ongoing, level-of-effort type activities for which discrete portions with starting and ending dates cannot be identified

4.3.2   Funds and Budgets

The purpose of this section is to establish the funding plan and budgets for the activities that are the subject of this plan.

Describe the funding plan, if applicable, in terms of funding projections, the rate of expenditure of allotted funds, and the funding year with respect to the calendar or fiscal year. Termination costs incurred in the event that an activity is terminated at any point in time must also be incorporated.

Describe funding limits in terms of total monetary obligation, yearly funding limits, overrun alternatives including company-provided funds, customer- approved rescheduling to reduce rate of expenditure, and termination of work when funding expires.

Describe the budget, and considerations affecting the budgeting process, in such terms as:

      a.   The cost, size, complexity, and importance of the activity for which the budget is being prepared
      b.   Negotiation schedules
      c.   Lower-level cost authorization procedures
      d.   The types of cost accumulations to be used
      e.   Target budgets for each organization and major activity, including such elements as:
            1)   Direct labor, by labor category
            2)   Materials, in dollars
            3)   Other direct costs
            4)   Cost-time relationship from start to completion dates
            5)   Development of Budgeted Cost of Work Scheduled by element of cost
      f.   Impacts due to rephasing and scheduling delays

4.3.3 Organization

The purpose of this section is to describe in detail the organizational structure for carrying out the activities and processes that are the subject of this plan, and to allocate tasks specifically to each of them. Describe both organizational elements and internal and external organizational relationships and interfaces. Identify:

      a.   The internal organizations and the elements thereof responsible for performing the planned tasks and activities
      b.   Interfaces between internal organizational elements, and with external organizations, and describe the responsibilities of each party to each interface
      c.   The individuals responsible for particular work items
      d.   Managers responsible for control
      e.   Control, advisory, and coordinating bodies such as Configuration Control Boards, including working groups and panels

Estimate staffing needs and allocate personnel to WBS activities in terms of:

      a.   Names or titles of key personnel
      b.   Qualifications and experience
      c.   Labor categories
      d.   Skill levels
      e.   Work assignments
      f.   Geographic location
      g.   Security level required
      h.   Availability to work extended hours
      i.   Time (hours, weeks, or months)
      j.   Hiring plans
      k.   Labor cost accounting

4.3.4 Equipment

Describe all required equipment in terms of:

      a.   Support for all functions to be performed throughout the life cycle
      b.   Source, and if an item is to be acquired, whether it will be purchased, leased, or rented
      c.   References to property management procedures to be observed

4.3.5 Materials, Facilities, and Other Resources

Describe physical facilities available or needed to support development and operational activities. Specify the criteria to ensure that facilities satisfy support requirements. Describe availability and allocation of facilities in terms of:

      a.   Purpose
      b.   Location
      c.   Use
      d.   Responsibility for operations cost
      e.   If not already available, the means for acquisition (e.g., by capital development, purchase, or lease)
      f.   References to property management procedures

As appropriate, include or refer to drawings, floor plans, and other graphic representations of the facilities.

Describe materials in terms of:
      a.   Support for the work being accomplished
      b.   Source (e.g., purchase, interdivisional work order)
      c.   Material control procedures

Describe other resources such as management software systems, communication networks, etc.

Identify and describe resources that must be acquired, and for each indicate:

    a.   Source or supplier
    b.   Date by which needed, acquisition lead time, and likelihood and impact of possible delays
    c.   Specification of the resource in terms appropriate to a purchase order, statement of work, etc.
    d.   Method of acquisition (purchase, rental, lease, etc.)
    e.   Estimated cost and source of funding

4.3.6 Management Reserves

Describe the estimation and allocation of management reserves in terms of:

    a.   Percentage withheld
    b.   Allocation criteria
    c.   Allocation procedure

4.4 Work Authorization

Describe the work authorization process in terms of the actions required to initiate, control, and terminate work. As applicable, describe the work authorization process in terms such as:

    a.   Specific work authorization statements including:
         1)   Complete statement of work to be performed
         2)   Resources provided
         3)   Technical and administrative direction
         4)   Work assignment and authorization
         5)   Reporting
    b.   Relationship to the Work Breakdown Structure
    c.   Schedule, including start, completion, intermediate milestones, and interface events
    d.   Budget, divided into labor, materials, and other direct costs
    e.   Supporting organizations
    f.   Identification of work authorization forms, contracts, purchase orders, etc., to be used
    g.   References to applicable Product Specifications, drawings, and other documents
    h.   Any special terms, conditions, or limitations

If the process is complex, include a work authorization process chart for clarification.

5.0   ACQUISITION ACTIVITIES PLAN

The purpose of this section is to specify tasks to be performed to manage the acquisition of the software. This section also identifies acquisition requirements and constraints, and specifies the standards to be applied for development and assurance.

The acquisition activities plan includes:

        a.   Procurement Activities Plan
        b.   Organizational Requirements and Life Cycle Adaptations
        c.   Management Approach
        d.   Technical Approach

Refer to the Acquisition Activities Plan DID (NASA-DID-M100) for a further description of the structure and content under each topic.

6.0   DEVELOPMENT ACTIVITIES PLAN

The purpose of this section is to describe the development process and engineering planning. This plan must meet the requirements stated in the contract and/or the acquirer's Management Plan.

The development activities plan section includes:

        a.   Methodology and Approach
        b.   Products and Reports
        c.   Formal Reviews
        d.   Interface Control Plan
        e.   Training for Development Personnel Planning

Refer to the Development Activities Plan DID (NASA-DID-M200) for further description of the contents of the development planning subsections.

7.0   SUSTAINING ENGINEERING AND OPERATIONS ACTIVITIES PLAN

The purpose of this section is to describe the plan for sustaining engineering and supporting operation of the software as installed in the overall system in terms of activities, methods and approach, controls, and support environment requirements. It is important to address activities after delivery of the software and prior to initiation of sustaining engineering and operations for the software in question.

The primary topics for the plan are:

      a.   Sustaining Engineering and Operations Processes
      b.   Product Support and Delivery

Refer to the Sustaining Engineering and Operations Activities Plan DID (NASA-DID-M300) for a further description of the structure and content for each topic.

8.0   ASSURANCE PLAN

Describe the activities to be performed by the organization preparing this Management Plan (or an assurance provider) for assurance of the software. Assurance activities include:

      a.   Review and acceptance testing of products
      b.   Verification and validation
      c.   Reliability and maintainability assurance and audits
      d.   Security and safety assurance
      e.   Certification

Refer to the Assurance Plan DID (NASA-DID-M400) for a further description of the structure and content for each topic.

9.0   RISK MANAGEMENT PLAN

The purpose of the Risk Management Plan is to identify potential risks affecting development or acquisition, specify analysis and monitoring methods including data collected, and state measures to control or minimize the effects of the risks.

The primary topics for the plan include:

      a.   Risk Assessment and Evaluation Process
      b.   Technical Risks
      c.   Security Risks
      d.   Safety Risks
      e.   Resource Risks
      f.   Schedule Risks
      g.   Cost Risks

Refer to the Risk Management Plan DID (NASA-DID-M500) for a further description of the structure and content under each topic.

10.0   CONFIGURATION MANAGEMENT PLAN

Describe the activities and plans for configuration management to be performed by the
organization preparing this Management Plan. The primary topics for the plan include:

    a.   Configuration management process
    b.   Configuration control activities
    c.   Configuration identification
    d.   Configuration change control
    e.   Configuration status accounting

Refer to the Configuration Management Plan DID (NASA-DID-M600) for a further description
of the structure and content for each topic.

11.0   DELIVERY AND OPERATIONAL TRANSITION PLAN

The purpose of this section is to specify and coordinate the activities for delivering and installing
the software to be performed by the organization preparing this Management Plan.

The topics for the plan include:

    a.   Support Preparation
    b.   Delivery and Installation Planning
    c.   User Training
    d.   Deliverable Item List

Refer to the Delivery and Operational Transition Plan DID (NASA-DID-M700) for the detailed
contents of this section.

12.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this
section.

13.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this
section.

14.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this
section.

15.0 APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-M100
ACQUISITION ACTIVITIES PLAN
DATA ITEM DESCRIPTION

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Section

EXPLANATORY NOTE

The purpose of the Acquisition Activities Plan is to provide a definition of the activities that must be undertaken to acquire software, through procurement or development, and to specify management and assurance requirements. This plan covers all aspects of the life cycle for the software including procurement.

NOTE: For software acquisition and/or development projects having the highest classification (as specified in NMI 2410.10), Section 5.0, Management Approach, and Section 6.0, Technical Approach, including all subsections found in those sections, must be included in their entirety without any tailoring.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   PROCUREMENT ACTIVITIES PLAN

Describe the procurement activities and events to be conducted and identify who will be responsible, where the activity will be performed, and when the activities will occur for each planned procurement.

3.1   Procurement Package Preparation

If appropriate, describe the justification for acquisition in terms of:

        a.   Existing resources:
              1)   Personnel
              2)   Equipment
              3)   Schedule
              4)   Funding availability

        b.   Alternatives considered; for each, address:
              1)   Added resources required
              2)   Commercial and inheritable capabilities available
              3)   Potential providers' capabilities
              4)   Reason for rejection or acceptance of alternative

Describe the steps to be taken to prepare the procurement package, such as:

    a.   Preparation of a Statement of Work
    b.   Development of a Work Breakdown Structure
    c.   Specification of a Data Requirements List
    d.   Specification of Contract Line Item Numbers
    e.   Development of associated schedule and cost information

3.2   Proposal Evaluation

Describe the proposal evaluation and selection activities to include formation of a Source Selection Evaluation Board, evaluation of documentation submitted by the bidders, and standards and practices to be followed. Describe the methods to be employed to evaluate pricing data, personnel qualifications, performance record, schedules, and quality attributes discussed in the proposals.

3.3   Contract Negotiation

Describe considerations which will govern contract negotiations including:

    a.   Cost and schedule adjustments
    b.   Technical and product adjustments
    c.   Access rights to commercial, reusable, and support computer hardware/software
    d.   Subcontractor management
    e.   Reporting requirements

3.4   Procurement Risks

Identify and describe procurement risks and contingencies that need to be assessed and handled during the procurement process. Describe the approach to be used to control or minimize the risks. In particular, address risks affecting at least:

    a.   Schedule, especially as affected by availability of personnel and equipment
    b.   Budget, especially as affected by funds allocation process, timing considerations, and costing methods

4.0   ORGANIZATIONAL REQUIREMENTS AND LIFE CYCLE ADAPTATIONS

4.1   Business Practices, Resources, and Organizational Requirements

Describe all requirements for business practices, methods, reporting, metrics, etc. Describe any requirements being imposed with respect to organizational structure; independence of verification and validation; and interfaces with the acquirer, other

providers, and other external organizations. Include any other resource requirements such as use of government-furnished equipment or facility access and security requirements.

4.2   Life Cycle Adaptations and Approved Waivers

Describe life cycle adaptations, which include products and reviews, and any approved waivers required in the management, development, and assurance of the software. Include any life cycle adaptation requirement for a phased delivery or incremental development approach.

An example of an adaptation may be the use of prototyping in feasibility studies, risk assessments, or design evaluations. Other adaptations may be requested for accommodating integration of other software being acquired which are GFE or COTS.

Describe the requirements during development to accommodate evolutionary acquisition of major upgrades (i.e., complete iterations of the life cycle) of the software.

5.0   MANAGEMENT APPROACH

Address the following items, which are of fundamental interest to project, field installation, and NASA Headquarters management.

5.1   Software Management Responsibilities

Identify all software for which the project is responsible and identify which organization(s) have responsibility (either total or partial) for which software. Include a clear delineation of software accountability. In addition, by using direct references to the organization chart for the project, identify the title of the person or organization responsible for the software deliverables.

5.2   Categorization and Classification Policy

The purpose of this section is to carefully explain the project's approach toward categorizing lower level elements (such as CSCIs) within a software system. If some lower level elements are more critical than others and thus will be managed differently, explain the criticality criteria, along with the difference in management as a function of criticality. If a project's entire software plan applies only to a selected subset of the effort, explain the criteria used to choose the selected subset.

Specify the risk classification (including safety and security considerations) for the lower level element with respect to its safety and criticality.

Describe the assurance requirements in terms of:

     a.   Level of assurance and types of activities, including any special requirements such as those for assurance of safety and security requirements
     b.   Product and quality assurance methods
     c.   Constraints affecting assurance approach, scope, or effectiveness
     d.   Testing methods to be employed, types of testing to be performed, and testing approaches
     e.   Verification and validation measures to be performed, and degree of independence required
     f.   Certification activities, if any
     g.   Products, reports, and metric data to be delivered

5.3   Management Mechanisms

Explain how the project is going to function from a management point of view in each of the following areas.

5.3.1   Requirements Development and Control

Identify functionally the major sources of requirements for the software, including the title of the person on the project responsible for generating, coordinating, and controlling these requirements. Include a diagram that defines the management relationship of all major requirements, generators, and software developers. Explain the way in which the project intends to control the requirements, both during the initial generation phase and when the software design is underway.

5.3.2   Schedule Development and Control

Identify the levels of software scheduling that will be used by the project and explain how these schedules will be integrated with the non-software elements of the project. Identify the titles of the persons and organizations responsible for both monitoring and implementing these schedules. Discuss the mechanisms used to report status against these schedules and to change milestone dates as a function of both the phases of the project and the hierarchy of schedules.

5.3.3   Resource Development and Control

Clearly identify the management process that will be used to determine the first estimate of the resources (people, budget, computer time, etc.) required to implement a set of software requirements on a given schedule. Provide an explanation of the mechanisms the project will use to ensure consistency throughout the phases of the project between the software schedules, requirements, and resources. Define those interaction

mechanisms (between field installation and/or agencies, as well as between contractors and Government agencies) required to ensure this consistency.

5.3.4   Internal Review Concepts

Explain how and when the project intends to review its own software. Define the kinds of reviews and their purposes. Identify the reviewers with particular attention to their relationship to the eventual users of the software.

5.3.5   External Review Concepts

Explain external review processes to be used to bring a system of checks and balances to the software development process. Give particular attention to the project's plan with respect to inclusion of nonproject personnel in major review activities and the identification of any independent verification and validation effort for the most critical elements of the software. Define the schedule for the reviews and verification.

5.3.6   Board Support

Describe the activities to be performed in support of control boards, working groups, etc. Define any reports to be generated by that activity.

5.3.7   Management and Control

Describe the activities relative to management activities during the life cycle, including monitoring, control of costs, schedules, etc. This section should include a description of the baselining process for products delivered to the acquirer. Define any reports and their content to be generated by this activity.

5.4   Documentation Requirements

Identify, by title and function, those documents that the project will use to manage the software process. Identify variations in the documentation requirements based upon the categorization policy in Section 5.2. Address the personnel and organizations responsible for creation, review, approval, maintenance, and control of the requirements.

5.5   Risk Management

Identify the areas of risk of particular concern and that shall be specifically addressed in the Risk Management Plan. Describe the requirements affecting risk evaluation and control, including types of data to be collected and assessed.

5.6   Configuration Management

Explain the software configuration management techniques to be used. Give particular attention to explaining any variations in the software configuration management scheme that may be a function of project phase, type of software, or software category as defined in Section 5.2. Clearly define the relationship between the software configuration management approach and that employed by the remainder of the project.

Describe the requirements for configuration management activities to be addressed in the Configuration Management Plan, including any requirements for interface between the acquirer's and provider's configuration management. Include any identification (naming) conventions and metrics or other status data required. Include any special security and safety process requirements for configuration management such as access restrictions.

Describe all metrics, reports, or related information.

5.7   System Assurance and Integration

Identify the mechanisms the project will employ to assure the quality of the software development process, as well as the end product. Address the tests by which the project will verify and validate that the project software/hardware systems operate together to meet the mission specifications.

5.8   Deviation and Waiver Procedures

Explain the procedures that will be followed to permit variations from the processes outlined in the software plans. Describe the approval process that allows deviation or waiver from the rules in the Management Plan.

5.9   Maintenance of Management Plan

State the method by which the Management Plan will be maintained. Address whether or not the plan will be updated incrementally or periodically and who will approve changes to the plan.

6.0   TECHNICAL APPROACH

The following topics shall be addressed as part of the technical approach.

6.1   System Requirements and Constraints

Describe the top-level functional requirements that must be satisfied by the various elements of the project software. In addition, enumerate and explain the major project

constraints on the software systems, including such items as inheritance from past projects, the precise computer(s) to be used, and other constraints that inhibit freedom of system design.

Describe any requirements affecting engineering and integration activities, such as:

a.	Specific languages, such as use of Ada for software
b.	Specific hardware
c.	Use of specific tools or support environments
d.	Use of techniques, such as prototyping
e.	Specific inheritables or reuse
f.	Any special security or safety considerations for the engineering and integration process

6.2   Integrated System Description

Describe and show a pictorial representation of the functional relationship between the various elements of the project software activity, as well as between the software and the hardware. Of particular importance are functional descriptions of the top-level interfaces between systems. Include an annotated generic diagram explaining the information flow from end-to-end.

6.3   Software Requirements Definition Process

Describe the major steps the project will follow leading up to the definition of the requirements for the software. Of particular interest are schedules for requirements definition, how implementing organizations will assess and/or approve the requirements, levels of detail contained in the requirements documents, and mechanisms employed to categorize or prioritize requirements.

6.4   Software Design and Implementation Process

Describe the major steps the project will follow to develop software that will meet the defined requirements. Milestone definitions, coding and checking concepts, functional allocation assessments, and schedules for software design and implementation should be included in this topic. If different types or categories of software follow a different process, identify the variations.

6.5   Software Test and Delivery Process

Describe the major test categories for the software, including not only the purposes of each test and its tie to requirements, but also the way in which each test will be evaluated. Schedules for testing should also be listed. Explain the interaction between the test process and the eventual software usage. Identify the checklist of prerequisites

that must be satisfied before a software program or group of programs is "ready." Include in the checklist a list of deliverables and a list of participating organizations. Present variations in this process as a function of the categorization described in Section 5.2.

Describe the requirements for delivery such as:

> a. Sites and methods for installation
> b. Installation support
> c. Conversion of existing data to new formats
> d. Acceptance process
> e. Final approving organization
> f. Provisions for training the users and operators
> g. Any special requirements such as for safety and security

6.6   Software Maintenance and Updating Process

Describe the major steps the project will follow after software has been declared "ready." In particular, describe how the project will manage changes in delivered software in response to both errors and new requirements, what criteria will be used for determining what capabilities go with what deliveries (if phased deliveries are part of the overall software schedule), and how the test and delivery process for a second or third revision of a program or group of programs differs from the test and delivery of the initial version of the program.

6.7   Software System Engineering

Describe the project's approach to software system engineering, including an explanation and schedule of technical tasks to be performed. Include the following topics.

6.7.1   Implementation Policies and Standards

Identify the top-level policies and standards that will be used in the development of the software throughout the project.

List or otherwise identify the standards that are applicable to the development, assurance, and management of the software, including any engineering and technical standards.

List or otherwise identify standards specified relating to use of a support environment(s) with respect to the management, development, and assurance of the software being acquired.

6.7.2   Interface Control Process

Identify the mechanisms that will be used to control interfaces between major subsystems (such as CSCIs or CSCs) of the software. Explain the kinds of items to be controlled, type of documentation to be used, and testing process used to verify the interfaces.

6.7.3   Data Generation and Management Process

Explain how the project will generate and manage the database of numbers that must be used by the software during operations. Identify the sources for data that will be used to test the software.

6.7.4   Performance Assessment Process

Explain how the project intends to monitor the performance of software as it is being developed. Specifically, identify those review activities and/or tests, including where they occur on the schedule, that will permit an accurate assessment of the most important performance parameters (size, timing, etc.). Describe all metrics, reports, or related information.

6.7.5   Operations Maintenance Process

Explain how the project intends to maintain the operational software once it is on-line. This explanation should address such issues as failure reporting, preventative maintenance, and fault protection procedures.

Describe the requirements for the sustaining engineering support such as:

    a.   Provision of technical assistance
    b.   User support and training
    c.   Modification and release of product
    d.   Assurance including regression testing and recertification

7.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

8.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

9.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

10.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-M200
DEVELOPMENT ACTIVITIES PLAN
DATA ITEM DESCRIPTION

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Section

EXPLANATORY NOTE

The purpose of the Development Activities Plan is to define the process and
activities by which the development provider will engineer and assure the
development of software.

1.0 INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0 RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0 METHODOLOGY AND APPROACH

Describe the overall approach for engineering and integration. Describe applied engineering methods and techniques to be employed during development.

3.1 Development Engineering

Describe the development engineering planning in terms of:

a. Life cycle definition including use of phased delivery and incremental development, and product deliveries
b. Statement of applicable standards
c. Engineering methods and techniques, such as requirements analysis approach, including interfaces between various methods across the life cycle. Such methods can be rolled-out into a separate methods document.
d. Trade-off studies, design rationale, etc.
e. If prototyping is intended to be used as a technique within any phase of the life cycle, then the plan for conducting the prototyping process should be detailed in Section 3.2. Use of the results of prototyping should be incorporated into the development planning section.
f. Informal reviews and walkthroughs
g. Informal engineering notes or products
h. Definition of engineering process and product metrics to be collected and assessed
i. Any special considerations, such as security, which could affect the engineering and integration process
j. Training materials development. If the development of the training materials is a major task, then this may be detailed further (in-line or separately) using the Training Development Plan DID (NASA-DID-M210).

3.2 Prototyping

The purpose of the Prototyping Plan is to define the prototyping process to be used within a specific phase(s) of the life cycle.

3.2.1   Purpose and Objectives

Describe the purpose and scope of the prototyping process, including in which phase(s) of the life cycle it is to be used and for what objectives.

Generally, prototyping is used to minimize risk by examining factors such as:

      a.   Technical feasibility
      b.   Performance capacities
      c.   Evaluation of alternatives
      d.   End user interface and user friendliness
      e.   Safety and reliability features
      f.   Trade-offs for allocation of requirements among software

Describe the specific objectives of the prototyping process to be used and its role in and interface to the development life cycle. If the prototyping process requires a major development for a lab bench or other such facility, then that shall be treated as a separate acquisition and shall require its own Management (Development) Plan, Product Specification, and Assurance and Test Procedures. This plan shall only address the use of such a facility in the prototyping process.

3.2.2   Products and By-Products

Describe the primary products of the prototyping process and how these products will be used in the engineering process of the software. For example, the final report from the prototyping process may be an input to the requirements or design of the software.

Make reports of prototyping activities accessible through the Management, Engineering, and Assurance Reports for this software.

If applicable, identify the by-products of the prototyping process. By-products may include hardware, software, models, and data which may be reused at management discretion in future prototyping or in development.

3.2.3   Feasibility and Risks

Prototyping in general, is used to reduce risks and evaluate trade-offs. Describe the expected feasibility of using the prototyping process to produce meaningful results for the development trades analysis process. Describe risks in terms of resources (equipment, time, software, etc.), technical factors, etc., and their effect upon the development process.

Consider the following factors, as appropriate:

a.   Operational limitations and constraints (e.g., emulation of interfaces) that will inhibit prototyping in a realistic environment
b.   Support limitations or constraints that will limit the effectiveness of the prototyping effort
c.   Analytical limitations or constraints that will limit the ability to evaluate data resulting from prototyping
d.   Resource limitations and constraints that will inhibit realistic representation

3.2.4   Description of Characteristics and Methods

Describe the characteristics of the prototyping process such as system tools used, software models, hardware breadboards, etc. Describe prototyping methods to be used, such as simulation, evaluation, use of software and hardware models, mock-ups, etc.

3.2.5   Analysis and Evaluation

Describe the process by which prototyping results will be analyzed. Describe how primary products of the prototyping process will be evaluated prior to incorporation into the development process' engineering analysis and products.

3.3   Integration

Describe the integration approach for the software in terms of the integration methodology applied, including use of phased delivery and incremental development, relationship to informal and formal revisions, and testing and product assurance. Describe the relationship with the developer's integration testing as defined in the Assurance Plan section of the Management Plan.

3.4   Engineering and Integration Support Environment

Describe the specific engineering and integration environment to be used for engineering and integration in terms of:

a.   Which techniques and tools are required in what phase, including technical management support and documentation tasks
b.   Support for generation and management of reports
c.   How to accept and apply new support environment tool releases to the integration environment
d.   How to adapt and apply the standard support environment engineering and integration rules and tools for this development, including a description of the tailoring process

    e.   The interface with the acquirer's environment for data and product releases

    f.   Any special restrictions on this environment, such as access restriction for security or safety

Also include any interfacing and support software including operating systems, pre-processors, test drivers, test data generators, and post-processors to be used.

4.0   PRODUCTS AND REPORTS

4.1   Baselining Process

Identify the baselining process to be used for deliverable products and the interface between the acquirer's and provider's baselining process. Include the role of formal reviews and configuration audits in the baselining process.

4.2   Product Specification Roll-Out Definition

Define which sections of the Product Specification are applicable to this development and their intended release per life cycle phase. Define intended roll-out definition for the Product Specification document.

4.3   Assurance and Test Procedures Roll-Out Definition

Define which sections of the Assurance and Test Procedures are applicable to this development and their intended release per life cycle phase. Define the intended roll-out definition for the Assurance and Test Procedures document.

4.4   Reports

Define what reports are to be generated or managed, their frequency, and content. Samples of specific report forms and instructions for completing them should be included in a standards and procedures repository or an appendix to this document. Make all reports accessible through the Management, Engineering, and Assurance Reports.

5.0   FORMAL REVIEWS

Describe the formal technical reviews required. Indicate how each review is to be conducted to assess the degree of completion of the development effort appropriate to the major milestone to which the review pertains. Relate these reviews to the product and/or software assurance activities.

Describe:

      a.   How reviews are conducted
      b.   Who must attend
      c.   Handling of discrepancies
      d.   Decision process associated with a review

6.0   INTERFACE CONTROL PLAN

The purpose of the interface control plan is to define the process by which the developer defines and manages all external interfaces between the software and all users, including human or other software. It may be appropriate to roll-out this plan when there are major coordination concerns and risks between the developer and the organizations responsible for the interfacing units.

6.1   Technical Interfaces

Describe engineering and integration interface control planning in terms of:

      a.   Identification of major external interfaces that need to be managed and defined
      b.   Definition of the process by which they are to be defined, including designation of working groups responsible for an interface
      c.   Identification of the products of the process, including the external interface requirements and design sections of the Product Specification, and reports

Describe all external technical interfaces between the software and its environment, including other software, end users, operators, and communications links.

6.2   Interface Controls

Describe the process by which interfaces are controlled, approved, baselined, etc. Describe the relationship of control processes to standard life cycle reviews and baselines.

7.0   TRAINING FOR DEVELOPMENT PERSONNEL PLANNING

The purpose of this section is to specify and coordinate the training to be conducted for personnel involved in the development effort.

The primary topics for the plan are:

       a.   Definition of Personnel Requiring Training
       b.   Types of Training by Categories of Personnel
       c.   Plan for the Conduct of Courses

8.0 ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

9.0 GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

10.0 NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

11.0 APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-M210
TRAINING DEVELOPMENT PLAN
DATA ITEM DESCRIPTION

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Section

EXPLANATORY NOTE

The purpose of the Training Development Plan is to provide planning for the development and verification of training materials. It is not for planning actual training of personnel.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   REQUIREMENTS FOR PERSONNEL TO BE TRAINED

Identify the types of personnel to be trained, categorizing the types as needed to establish training objectives for each. For each type of personnel to be trained specify:

    a.   Training goals and objectives
    b.   Major topics to be addressed in the training
    c.   Characteristics of the personnel type affecting the training, e.g., educational level, language spoken

    d.   Number of trainees for each training topic
    e.   Skill level to be attained through the training
    f.   Number of persons to be trained (by location if there are multiple sites)

Address all user and operator classes of personnel.

Address what organization will conduct the training and for what length of time the training will be required.

4.0   CURRICULUM DEVELOPMENT REQUIREMENTS

Describe the plan for preparing curricula for each type of training to be delivered and for the preparation of related training materials. Include any constraints on length, type, and amount of training for each class of personnel to be trained.

Describe requirements and any constraints for each class of training on the style and media of the training materials such as:

    a.   Self study modules
    b.   Classroom lessons
    c.   Simulation capabilities
    d.   On-the-job training plans

Lesson plans and other instructional materials that are prepared to implement training may be included here. Note that actual training materials are part of the Product Specification associated with a specific product.

5.0   EVALUATION AND MODIFICATION

Describe the process by which the training materials will be evaluated and updated. Include a description of metric and assessment data to be collected.

6.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

7.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

8.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

9.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-M300
SUSTAINING ENGINEERING AND OPERATIONS ACTIVITIES PLAN
DATA ITEM DESCRIPTION

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Section

EXPLANATORY NOTE

The purpose of the Sustaining Engineering and Operations Activities Plan is to define the process by which the organization preparing this Management Plan intends to maintain and operate the software and process change requests. This includes plans for training the users and operators of the software.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   SUSTAINING ENGINEERING PROCESS

Describe the methods to be used to specify modifications or new functional requirements. Also describe how to translate these requirements into design and how to integrate and test the new system release.

Describe the process by which change requests are to be submitted, classified and analyzed, dispositioned, and scheduled. Include classification categories for requests and any variations in the process. Describe all associated products and reports.

Describe the engineering process, methods, etc., to be used to incorporate approved change requests. Include a description of maintenance procedures for developing on-site and remote diagnostics. Include the method for producing documentation updates (including user support materials) to accompany a release and for distributing them to all operators and end users concerned.

Describe the process interfaces between sustaining engineering (maintenance) engineers and configuration management, assurance, and operator organizations. Describe interfaces with the user community and how releases are generated and delivered.

Describe the training plan for sustaining engineering, operations, and other support personnel.

This section contains planning activities similar to those in the Development Activities Plan (NASA-DID-M200) plus some activities specific to sustaining engineering and operations. The Development Activities Plan (NASA-DID-M200) may be used as a model for substructure and further description.

4.0   PRODUCT SUPPORT

4.1   User Support

Describe support activities to be established to assist users, such as:

   a.   A help desk to respond to problems reported by users and to represent users on change control and review boards
   b.   Support of change request generation and submittal
   c.   Providing users with documentation concerning new and modified capabilities or information in new product releases

Describe how an effective interface is to be maintained between users and maintenance (technical) staff.

Describe activities required to report and service error conditions in terms of classes of errors, specific recovery requirements for the various error conditions, and any changes or modifications to the system resulting from critical error situations.

4.2 User and Operator Training

The purpose of this section is to specify and coordinate the training to be conducted for end users and operators of the software.

Topics to be addressed include:

a.   Classes of users to be trained
b.   Available curriculum
c.   Training delivery
d.   Assessment and follow-up training
e.   Evaluation of adequacy of training curriculum and materials
f.   Facility and equipment requirements for conducting training

5.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

6.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

7.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

8.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-M400
ASSURANCE PLAN
DATA ITEM DESCRIPTION

TABLE OF CONTENTS

Section

EXPLANATORY NOTE

The purpose of the Assurance Plan is to specify the conduct of quality assurance, quality engineering assurance, safety assurance, security and privacy assurance, testing, verification and validation, and certification during the acquisition or development of software.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   QUALITY ASSURANCE PLANNING

The purpose of this section to specify the measures and activities to be undertaken to assure the quality of the acquisition or development processes (including configuration management) and their resultant products. Planning shall include activities and measures to assure quality and to evaluate the degree of conformance to plans, standards, and procedures specified in the Management Plan.

3.1   Approach and Activities

The purpose of this section is to describe the detailed quality assurance activities for assessing the conformance to standards and plans of the software products and related processes.

Specify and define the reviews and audits to be conducted to assure that both processes and products fulfill the Management Plan requirements and designated standards and procedures. Address at a minimum the following:

      a.   Assurance activities to be performed in conjunction with formal reviews, such as the Preliminary Design Review or Critical Design Review, for the purpose of evaluating the quality of the products being reviewed

      b.   Auditing activities to be conducted to assess quality of performance of management, technical, and assurance processes

      c.   Auditing activities to be conducted to identify the specific contents of delivered products and configuration-controlled baselines, such as physical configuration audits and functional configuration audits

     d.   Evaluation of the effectiveness of problem reporting, corrective action, and change control and configuration management practices

3.2 Methods and Techniques

The purpose of this section is to describe the methods and techniques to be used for all quality assurance activities listed in Section 3.1.

3.3 Products

Describe the specific format and structure of the products produced by the activities given in Section 3.1. These products are the appropriate Quality Assurance section of the Assurance and Test Procedures document and reports (such as review or audit reports) that are to be incorporated in the Management, Engineering, and Assurance Reports. Also describe metric data to be collected and assessed.

4.0 VERIFICATION AND VALIDATION PLANNING

The purpose of this section is to specify the plans for conducting verification and validation activities, the methods to be employed, and the degree of independence required.

4.1 Approach and Activities

Describe the overall approach to be used to verify and validate the software across the entire life cycle. Describe the specific verification and validation activities to be conducted, such as reviews, audits, inspections, and testing, to support the verification and validation approach.

Describe the overall plan for types (unit, integration, acceptance) of testing. Discuss priorities or particular emphasis on testing, such as reliability and maintainability requirements. Include test management assurance planning for verifying that test standards and procedures have been established and followed, all test requirements have been satisfied, and all test results have been recorded properly. Accommodate any phased delivery or incremental development considerations.

Specify the structure, including roll-out, for the testing section(s) of the Assurance and Test Procedures.

Describe the process, including reporting and change control procedures, to be followed if tests fail, and for retesting after products are updated or patched.

Specify requirements for test reviews prior to and at the conclusion of testing.

Describe the test results reports required. All reports should be included or tracked under the Management, Engineering, and Assurance Reports.

4.2 Methods and Techniques

Describe the specific methods and techniques to be used for all the verification and validation activities listed in Section 4.1.

4.3 Products

Describe the specific format and structure of the products produced by the activities given in Section 4.1. These products are the appropriate Verification and Validation section of the Assurance and Test Procedures and reports (such as review, test, or audit reports) that are to be incorporated in the Management, Engineering, and Assurance Reports. Also describe metric data to be collected and assessed.

5.0 QUALITY ENGINEERING ASSURANCE PLANNING

The purpose of this section is to specify plans for conducting quality engineering assurance. Planning shall include activities and measures to assure reliability, maintainability, and other similar quality factors specified in the Product Specification.

5.1 Approach and Activities

The purpose of this section is to describe the detailed quality engineering assurance activities for assessing the quality factors (reliability, maintainability, etc.) of the software products as specified in the Product Specification and in the Acquisition Activities Plan section of the Management Plan.

Specify and define:

    a.   Reliability-related activities, including analyses of failure probabilities and failure rates, as well as plans for use of math models and diagrams, tools, and Failure Modes and Effects Analyses

    b.   Maintainability-related activities, including plans for software maintainability, such as module or unit cohesion, coupling, and employment of coding standards, and expectations for the system in terms of Mean Time Between Maintenance

    c.   Other quality factors (the other "ilities") as specified in the Product Specification and requirements section of the Acquisition Plan.

5.2   Methods and Techniques

The purpose of this section is to describe the methods and techniques to be used for all quality engineering assurance activities listed in Section 5.1.

5.3   Products

Describe the specific format and structure of the products produced by the activities given in Section 5.1. These products are the appropriate Quality Engineering Assurance sections of the Assurance and Test Procedures and reports (such as analysis reports) that are to be incorporated in the Management, Engineering, and Assurance Reports. Assurance information recorded in the Assurance and Test Procedures for quality engineering assurance should provide numeric measures of the quality factors being evaluated, such as Mean Time Between Failures or expectations of time to repair or recalibrate, whenever possible. Also describe metric data to be collected and assessed.

6.0   SAFETY ASSURANCE PLANNING

The purpose of this section is to specify plans for verifying and validating the safety requirements of the software. The specific activities involved in performing this assurance may vary between acquirer and providers.

6.1   Approach and Activities

Describe the overall approach to be used to perform the safety assurance activities for the software. Describe the specific activities with respect to analysis and review of specific aspects in terms such as:

    a.   Hazards
    b.   Fault tolerance
    c.   Safety criteria such as fail-safe, fail-soft, and fail-operational

This will typically include stating how the safety requirements defined in the Product Specification for a product will be assured.

6.2   Methods and Techniques

The purpose of this section is to describe the methods and techniques to be used for all safety assurance activities listed in Section 6.1.

6.3   Products

Describe the specific format and structure of the products produced by the activities given in Section 6.1. These products are the appropriate Safety Assurance sections of

the Assurance and Test Procedures and reports that are to be incorporated in the Management, Engineering, and Assurance Reports. Describe metric data to be collected and assessed.

7.0   SECURITY AND PRIVACY ASSURANCE PLANNING

The purpose of the security and privacy assurance plan is to provide planning for the assurance of the security and privacy aspects of the software. The security and privacy requirements for the software appear in the Product Specification or the in the Acquisition Activities Plan section of the acquirer's Management Plan. The statement of how security and privacy requirements are to be met appears in the Product Specification.

7.1   Approach and Activities

Describe the overall approach to be used to perform security and privacy assurance activities for the software. Describe the specific activities with respect to analysis and review of specific security and privacy aspects in terms of degree of integrity, minimization or potential for abuse or misuse, and maintenance of continuity of operations. Aspects may include:

a.   Effective and accurate operations
b.   Protection from unauthorized alteration, disclosure, use or misuse of information processed, stored, or transmitted
c.   Maintenance of continuity of automated information support
d.   Incorporation of management and operational controls
e.   Appropriate technical, administrative, environmental, and access safeguards

7.2   Methods and Techniques

The purpose of this section is to describe the methods and techniques to be used for all security and privacy assurance activities listed in Section 7.1.

7.3   Products

Describe the specific format and structure of the products produced by the activities given in Section 7.1. These products are the appropriate Security and Privacy Assurance sections of the Assurance and Test Procedures and reports that are to be incorporated in the Management, Engineering, and Assurance Reports. Describe metric data to be collected and assessed.

8.0   CERTIFICATION PLANNING

The purpose of this section is to define the planning for conducting certification activities.

8.1   Approach and Activities

Describe the overall approach to be used to certify the software. Describe the specific certification activities to be conducted, such as tests, reviews, audits, or inspections, to support the certification approach.

8.2   Methods and Techniques

The purpose of this section is to describe the methods and techniques to be used for all certification activities listed in Section 8.1.

8.3   Products

Describe the specific format and structure of the products produced by the activities given in Section 8.1. These products are the appropriate Certification section of the Assurance and Test Procedures and certification reports that are to be incorporated in the Management, Engineering, and Assurance Reports. Also specify any metric data to be collected and assessed.

9.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

10.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

11.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

12.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-M500
RISK MANAGEMENT PLAN
DATA ITEM DESCRIPTION

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Section

EXPLANATORY NOTE

The purpose of the Risk Management Plan is to define the process by which the acquirer or provider identifies, evaluate, and minimize the risks associated with the software.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   RISK ASSESSMENT AND EVALUATION PROCESS

Describe the plan for risk reduction or control. Be sure to address each of the following topics:

a.   Describe the process to be used to identify the risks affecting acquisition or development of the software, assess the potential impact of each, and determine measures to control or reduce them. Describe the risk evaluation approach including assessment of the impact on the entire software should any lower level elements (such as CSCIs or CSCs) be delivered late or be noncompliant.

b.   Describe the measures for continual assessment and monitoring of risks throughout the life cycle including specific data to be collected. Include approaches to control risks where possible, or to minimize the impact of risks that cannot be controlled.

c.   For each of the risk categories (Sections 4.0 - 9.0), describe the measures to be taken to monitor the risk level, control the degree of susceptibility to that risk category, or minimize the potential effects of the risks.

d.   Define the reports to be generated and their content. All reports shall be accessible through the Management, Engineering, and Assurance Reports.

4.0   TECHNICAL RISKS

Describe the continuing analysis to be performed of the risks associated with technical parameters, including:

a.   Methods of risk assessment (e.g., prototyping)
b.   Testing requirements
c.   Contingency development plans
d.   Critical milestones used to track and reassess risks

5.0   SAFETY RISKS

Describe the safety risks and contingencies in terms of:

a.   Safety risk analysis
b.   Safety decision methodology
c.   Adequacy of product assurance to ensure safety
d.   Configuration management and procedures that impact safety

6.0 SECURITY RISKS

Describe security risks and contingencies in terms of:

       a.   Security threat analysis
       b.   Security decision methodology
       c.   Formal security policy model including discretionary and mandatory access control enforcement
       d.   Configuration management and procedures for secure distribution of the system to sites

7.0 RESOURCE RISKS

Describe resource risks and contingencies in terms of resource definition and allocation methodology as well as personnel, facilities, and equipment availability.

8.0 SCHEDULE RISKS

Describe schedule risks and contingencies in terms of schedule definition, assignment of responsibilities, source availability, and tracking. Consider impact of schedules from resource risks such as equipment and personnel availability.

9.0 COST RISKS

Describe development cost risks and contingencies including assessment of:

       a.   Precision of cost estimates
       b.   Effects of schedule changes
       c.   Changes in funds allocation
       d.   Costing methodology
       e.   Accounting methods and practices

10.0 ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

11.0 GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

12.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

13.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-M600
CONFIGURATION MANAGEMENT PLAN
DATA ITEM DESCRIPTION

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Section

EXPLANATORY NOTE

The purpose of the Configuration Management Plan is to define the configuration management process for the software and its associated products.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   CONFIGURATION MANAGEMENT PROCESS OVERVIEW

Provide an overview of the configuration management process. Discuss the various activities and summarize the flow of information and products developed within the

configuration management structure. Include a description of the process of incorporating products received into the baselines maintained by the preparing organization. Be sure to address any access restrictions.

Describe the configuration management information flow in terms of a flow chart or similar graphic. Show each review and control board in the context of the information flow. Summarize change control reports to be generated and how they are to be tracked.

If appropriate, describe special considerations for security that are to be supported by configuration management, such as analyzing proposed changes for adverse effects on security or recording each access to secure data under configuration control.

4.0   CONFIGURATION CONTROL ACTIVITIES

The purpose of this section is to identify and describe the activities to be performed by a configuration control staff and associated organizations. Address at least the topics discussed in the following subsections and include others, such as document revision and technical information center activities, as appropriate.

4.1   Configuration Identification

Describe the configuration identification process and standards for all items in the software system configuration(s). Include a description of each provider's developmental configuration with respect to the methods used by the provider in establishing the configuration and identifying its contents.

Methods for establishing a configuration shall include the manner of identifying (e.g., naming, marking, numbering) the system and its lower level elements (such as CSCIs or CSCs).

4.2   Configuration Change Control

Describe configuration change control responsibilities and activities to be used in maintaining and controlling changes to baselined products, including those identified in the following subsections.

4.2.1   Controlled Storage and Release Management

Describe the methods and activities to be used to formally control the receipt, storage, handling, and release of deliverable configuration items. Specify needs and methods for restricting access to controlled items. Be sure to address any special considerations such as measures taken to ensure security and privacy, e.g., access restrictions, consisting of codes to protect data and system integrity against unauthorized use.

4.2.2   Change Control Flow

Discuss the initiation, transmittal, review, disposition, implementation, and tracking of discrepancy reports and change requests. Use a graphic representation of the change control flow if this provides clarity.

4.2.3   Change Documentation

Describe each report used in the configuration management process and explain its purpose and use. Include an example of each report form or cite the location where the forms can be found (e.g., in the appropriate standards and procedures repository).

For each report:

        a.   Describe the function of this report.
        b.   Identify who may initiate the report.
        c.   Describe subsequent handling and updating of the report.

All reports shall be accessible through the Management, Engineering, and Assurance Reports. Also describe any metric data to be collected and analyzed.

4.2.4   Change Review Process

Describe the process by which each control and review board for configuration management carries out its responsibilities and functions. Describe how each board will provide historical traceability with respect to the configuration identification scheme.

4.3   Configuration Status Accounting

Define the configuration status accounting system's records and reports in terms of purpose, general content, and accessibility.

5.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

6.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

7.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

8.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-M700
DELIVERY AND OPERATIONAL TRANSITION PLAN
DATA ITEM DESCRIPTION

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Section

EXPLANATORY NOTE

The purpose of the Delivery and Operational Transition Plan is to provide the planning for the transition of software from development into its operational phase. This plan may incorporate, if applicable, details contained in the individual delivery planning sections.

If the preparation of an operational site is the responsibility of an organization other than the one writing this Management Plan, then site preparation planning should be incorporated into the other organization's Management Plan. In any case, if the preparation of the operational site is a major activity, then a separate development plan for that site should be prepared.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   SITE PREPARATION PLANNING

3.1 Facility Planning

Describe the preparation for the supporting facility in terms such as:

  a.   Facility sizing
  b.   Facility preparation
  c.   Facility scheduling plan and process
  d.   Definition of required hardware, support software, facility support (air conditioning, etc.)

3.2 Transition Planning

Describe the preparation for the transition to be provided at the site(s) in terms such as:

  a.   Transition process including coordination between the developer's engineering personnel and support personnel
  b.   Overall coordination for preparation and implementation including identification of discrepancies or omissions
  c.   Identification of transition action items and assignment of responsibility for their completion
  d.   Ensuring that all manuals and other required software products are available when needed
  e.   Technical assistance
  f.   Site personnel to support delivery installation team
  g.   Priority scheduling to ensure adequate software response
  h.   Any phase-over transition of safety, security or training responsibilities

4.0   DELIVERY PLANNING

Identify, describe, and schedule the tasks associated with delivery and installation of the software, in terms such as:

  a.   Installation plan, including transition from developer to operations personnel
  b.   Packaging requirements, in terms of equipment, materials, dates, personnel, and degree of protection needed

      c.   Shipment requirements, in terms of methods, shippers, dates, estimated size and volume, etc.

5.0   DATA CONVERSION PLANNING

Identify and describe existing data files and databases that must be converted for use with the software. Specify how the conversion will be accomplished.

6.0   USER TRAINING PLANNING

The purpose of this section is to specify what training is to be provided to users (by user classes) and the means, materials, and facilities by which the training will be delivered.

Topics to be addressed include:

      a.   Classes of users to be trained
      b.   Available curriculum
      c.   Training delivery
      d.   Assessment and follow-up training
      e.   Evaluation of adequacy of training curriculum and materials
      f.   Facility and equipment requirements for conducting training

7.0   OPERATOR TRAINING PLANNING

The purpose of this section is to specify what training is to be provided to personnel who are to operate the software.

Topics to be addressed include:

      a.   Classes of users to be trained
      b.   Available curriculum
      c.   Training delivery
      d.   Assessment and follow-up training
      e.   Evaluation of adequacy of training curriculum and materials
      f.   Facility and equipment requirements for conducting training

8.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

9.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

10.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

11.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

APPENDIX D

PRODUCT SPECIFICATION DATA ITEM DESCRIPTIONS

This appendix contains the specifications for the format, outline, and content of the Product Specification and rolled-out sections. Major sections of the Product Specification have been rolled-out into separate Data Item Descriptions (DIDs) using the template DID (NASA-DID-999) for purposes of clarity and manageability.

The Product Specification DIDs provide outlines for a complete Product Specification. Major sections of the Product Specification point to lower level DIDs that contain more detailed content descriptions of these major sections.

The number of Product Specifications generated does not need to mirror the number of DIDs presented in this section. Lower-level detailed DIDs provide additional substructure and contain content discussion which should be reviewed even when the content is recorded in-line (i.e., not rolled-out).

The detailed DIDs in this appendix may be used as they stand to produce separate documents from the Product Specification.

Table D-1. Product Specification DIDs (Numeric Order)

Table D-2. Complete DID Set for a Product Specification

NASA-DID-P000   Product Specification DID
      NASA-DID-P100   Concept DID
      NASA-DID-P200   Requirements DID
      NASA-DID-P300   Architectural Design DID
      NASA-DID-P400   Detailed Design DID
        NASA-DID-P410   Firmware Support Manual DID
      NASA-DID-P500   Version Description DID
      NASA-DID-P600   User's Guide DID
      NASA-DID-P700   Operational Procedures Manual DID

NASA-DID-P000
PRODUCT SPECIFICATION
DATA ITEM DESCRIPTION

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Section

EXPLANATORY NOTE

The purpose of the Product Specificaon is to document the technical aspects relative to the development of the software. This information is produced over the life cycle for the software.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   CONCEPT

The purpose of this section is to provide an overview of the software. When required, this section provides the scope and context that will aid in understanding the requirements. Depending upon the system decomposition and the size and complexity of the parent software, this section may not be needed. If this is the case, reference the appropriate concept section.

The primary topics for the concept section include:

      a.   Definition and Purpose
      b.   User Definition
      c.   Capabilities and Characteristics
      d.   Sample Operational Scenarios

Refer to the Concept DID (NASA-DID-P100) for further description of the structure and content.

4.0   REQUIREMENTS

The purpose of this section is to specify and augment, as appropriate, the functional, performance, and interface requirements of the software. The section also specifies the major characteristics, implementation constraints, and design goals.

The primary topics for the requirements specification include:

      a.   Requirements Approach and Tradeoffs
      b.   External Interface Requirements
      c.   Software Requirements
      d.   Traceability to Parent's Design
      e.   Partitioning for Phased Delivery

Refer to the Requirements DID (NASA-DID-P200) for further description of the structure and content for each topic.

5.0   ARCHITECTURAL DESIGN

The purpose of the architectural design is to document the top-level, comprehensive design for the software (which may consist of one or more CSCIs, CSCs, or CSUs) including major external and internal interfaces and logical data scheme. In addition, the section should describe the rationale for the architecture.

The primary topics for the architectural design specification include:

a. Design Approach and Tradeoffs
b. Architecture Design Description
c. External Interface Design
d. Traceability to Requirements
e. Partitioning for Incremental Development

Refer to the Architectural Design DID (NASA-DID-P300) for further description of the structure and content for each topic.

6.0 DETAILED DESIGN

The purpose of this section is to describe the design for the software in enough detail to be able to write the software code to implement the design. Detailed design defines the structure and functions down to the computer software unit level.

The primary topics for the detailed design specification include:

a. Detailed Design Approach and Tradeoffs
b. Detailed Design Description
c. External Interface Detailed Design
d. Traceability to Architectural Design
e. Coding and Implementation Notes
f. Firmware Support

Refer to the Detailed Design DID (NASA-DID-P400) for a further description of the structure and content for each topic.

7.0 VERSION DESCRIPTION

This section will describe in detail the configuration and content of the product and instructions for its set-up. For each new release, the section also provides information on the status of changes since previous releases.

The primary topics for the version description include:

a. Changes in Functional Capabilities
b. Set-up Instructions
c. Inventory and Software Product Identification
d. Change Status
e. Adaptation Data

Refer to the Version Description DID (NASA-DID-P500) for a further description of the structure and content for each topic.

8.0   USER DOCUMENTATION

8.1   User's Guide

The purpose of the software User's Guide is to provide instructions to end users (human and other systems) on the use of the software.

The primary topics for the User's Guide include:

>   a.   Overview of Purpose and Functions
>   b.   Installation and Initialization
>   c.   Startup and Termination
>   d.   Functions and their Operation
>   e.   Error and Warning Messages
>   f.   Recovery Steps

Refer to the User's Guide DID (NASA-DID-P600) for a further description of the structure and content under each topic.

8.2   User's Training Materials

The purpose of this section is to document the training materials provided for the users. This section will contain the actual training materials. When media other than paper hard copy are used, describe the media and reference training materials such as video tapes and computer-aided instruction files.

9.0   OPERATIONAL PROCEDURES MANUAL

The purpose of the Operational Procedures Manual is to provide instructions to the system operators (as opposed to end users) on the procedures for operating, controlling, troubleshooting, and maintaining the software.

The primary topics for the Operational Procedures Manual include:

>   a.   System Preparation and Set-up Procedures
>   b.   Standard Operating Procedures
>   c.   Fault and Recovery Procedures
>   d.   Emergency Procedures
>   e.   Diagnostic Procedures

Refer to the Operational Procedures DID (NASA-DID-P700) for a further description of the structure and content under each topic.

10.0   MAINTENANCE MANUAL

The purpose of the Maintenance Manual is to provide a location for data and information to aid in analyzing and debugging the software. This should not duplicate information available in other sections of the Product Specification.

10.1   Implementation Details

Describe details about:

      a.   Specific data representations or formats
      b.   Operating system interfaces and dependencies
      c.   Support software such as libraries
      d.   Hardware dependencies
      e.   Other interfaces

10.2   Modification Aids

Describe design details that could be used in the modification or expansion of the software.

10.3   Code Adaptation

Describe design details that support the initialization or adaptation of data or code. Relate this information to version information of the software.

11.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

12.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

13.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

14.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-P100
CONCEPT
DATA ITEM DESCRIPTION

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Section

EXPLANATORY NOTE

The purpose of the Concept is to provide an overview of the software. The Concept section should be relatively brief. The Concept provides the context in which to read the Requirements section of the Product Specification. All requirements should be traceable, in a general sense, to the functions or capabilities described in the Concept. However, the Requirements section (or document, if the section is rolled-out), is the governing specification for the product.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   DEFINITION OF <THE SOFTWARE>

Throughout this presentation of the Concept, the term "user" refers both to humans and to interfacing software.

3.1   Purpose and Scope

Briefly describe the purpose to be served by the software that is the subject of this Concept and the scope of its applicability. Describe the primary use(s) of the software within the context of the users' environments.

3.2   Goals and Objectives

Describe the goals and objectives for the software.

3.3   Description

Provide a top-level description of the software and its major external interfaces to provide a background to aid the reader in understanding what the software is to accomplish.

Use appropriate graphics, illustrations, tables, etc., to show functions and interrelationships.

3.4   Policies

List or reference the policies and standards governing the use and applicability of this software. State "none" if none has been used.

4.0   USER DEFINITION

List and describe the expected users of the software, the way in which the users will be using the software, and the functional capabilities the users will require to perform their activities. Explicitly define the users and their needs; use terms and details that will make it possible to correlate system capabilities and characteristics to specific user needs.

5.0   CAPABILITIES AND CHARACTERISTICS

Describe the major operational capabilities to be provided by the software. Identify which users' needs are supported by each capability. Use a table, matrix, or graphics if appropriate for clarity.

Describe significant characteristics required of the software. Possible areas of discussion are:

a. Architecture
b. Process capabilities
c. Data structures
d. Performance
e. Interfaces
f. Error recovery capabilities
g. Reliability
h. Risk criticality
i. Safety and security
j. Maintainability
k. Flexibility and expansion
l. Transportability
m. Quality
n. Adaptation to various operational sites
o. Security
p. Phase implementation

Discuss also:

a. Characteristics of the current and potential physical and organizational environment for the software.
b. The general flow of both execution control and data across external interfaces for the software, including hardware and networking considerations affecting software operation.

If there are major design constraints imposed upon this software, identify and describe each of them.

6.0 SAMPLE OPERATIONAL SCENARIOS

Describe typical operational scenarios for the software. The scenario depicts at a high level how users (including other systems) interact with the capabilities provided by the software being defined. Include at least one scenario for each class or type of user.

A sample scenario would include such matters as:

a. A description of an operation to be performed with support from the software
b. A description of the interaction between a user and the software in carrying out the operation

7.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

8.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

9.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

10.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-P200
REQUIREMENTS
DATA ITEM DESCRIPTION

TABLE OF CONTENTS

Section

EXPLANATORY NOTE

The purpose of the Requirements is to specify the functional, performance, and
interface requirements for the software. Requirements approach and tradeoff
results are described. This section also specifies the major characteristics,
implementation constraints, and design goals for the software.

Each requirement should be uniquely identified to ensure traceability to the lowest level of
implementation. A hierarchical or other classification scheme may be used to designate
requirements that are allocated by groups to higher-level elements and functions.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   REQUIREMENTS APPROACH AND TRADEOFFS

Describe the overall approach in gathering, analyzing, and synthesizing requirements, including use of prototyping techniques. Explain the tradeoff process used to analyze conflicting requirements and arrive at the actual specifications for those requirements. Requirements trades and analysis information (such as a prototyping effort report), especially those that must be reevaluated or considered when changes are proposed during development or maintenance, should be included in an appendix or explicitly referenced.

4.0   EXTERNAL INTERFACE REQUIREMENTS

This section contains the specification of requirements for interfaces between this software and its external environment (i.e., all its users). This section should be rolled-out when it is to be placed under configuration control as a separate item. When rolled-out, it becomes the External Interface Requirements document.

Identify and describe each interface with each class of user. Each interface may represent a bi-directional flow of information. Use graphics of the interfaces when appropriate for clarity.

Specify the requirements governing each interface. Number or otherwise uniquely identify each requirement for the sake of traceability. Specify each requirement in testable, quantitative terms. Provide additional information about each requirement to aid in understanding its purpose and effect, and the goals for reliability, flexibility, etc.

The requirement definition should address the following topics, as appropriate:

  a.   Purpose of the interface
  b.   Requirements for the interface, such as process, performance, safety, security, etc.
  c.   Implementation constraints on the interface
  d.   If applicable, traceability to parent's design

5.0   REQUIREMENTS SPECIFICATION

5.1   Process and Data Requirements

Describe, as separately numbered items for traceability, the process and data requirements for the software in such terms as:

   a.   Functions
          1.   Input data and source
          2.   Transactions including algorithms
          3.   Output data and destination

   b.   Data
          1.   Definition
          2.   Relationships and structure
          3.   Protection requirements
          4.   Validity check requirements
          5.   Parameterization requirements
          6.   Format or implementation restrictions

5.2   Performance and Quality Engineering Requirements

Specify, as a separately numbered item for traceability, each performance requirement for the software. Express each requirement in testable and quantitative terms.

   a.   Address performance requirements such as:
          1.   Timing and sizing requirements
          2.   Sequence and timing of events, including user interaction tolerances
          3.   Throughput and capacity requirements
   b.   Describe error detection, isolation, and recovery requirements for data and processes
   c.   Describe quality engineering requirements such as reliability, maintainability, or portability

5.3   Safety Requirements

Specify, as separately numbered items for traceability, the safety requirements for the software, including, in a prioritized list, the following:

   a.   Software hazard requirements which identify hazards and potential contributions to system mishaps
   b.   User interface considerations from a human factors engineering viewpoint, including information flow, processing analysis, estimates of potential operator/maintainer processing capabilities, and analysis of critical tasks

5.4   Security and Privacy Requirements

Specify, as separately numbered items for traceability, the security and privacy requirements for the software, including access limitations to the system, such as existence of log-on procedures and passwords, and of data protection and recovery methods. Express each requirement in testable and quantitative terms. Prioritize these requirements.

5.5   Implementation Constraints

Describe general implementation constraints on the design and implementation of the software, such as the use of GFE, COTS, or use of specific compilers, etc. If existing software is required to be used or modified, include such requirements here.

List or reference engineering and technical standards to be applied in the development of the software.

5.6   Site Adaptation

Specify requirements for adapting the software to the physical environments within which it operates, including site-specific adaptation data or special parameters that are defined during installation. Adaptation requirements may be presented in tabular form.

5.7   Design Goals

State design goals for the software in terms of:

     a.   Correctness to the degree that the implemented system is to satisfy its requirements
     b.   Reliability of the implemented system to consistently perform its intended function
     c.   Efficiency with which the implemented system is to use computer resources
     d.   Maintainability
     e.   Technology transparency

6.0   TRACEABILITY TO PARENT'S DESIGN

Describe how these requirements map to the requirements allocated from the parent. Use a table for presentation as an aid to clarity, and show that requirements allocated from the parent have been taken into account and also that requirements specified herein can be traced to the parent, or that there is a valid reason for introduction of any new requirements at this level.

7.0   PARTITIONING FOR PHASED DELIVERY

If the software is to be developed in several stages for phased delivery, identify the content for each delivery in terms of:

a.   Requirements and functions to be satisfied in the initial delivery
b.   Additional requirements and functions to be satisfied for each successive delivery

Note that incremental development or phased delivery decisions at a higher (parent) level may impose phased delivery requirements upon this lower level.

8.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

9.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

10.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

11.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-P300
ARCHITECTURAL DESIGN
DATA ITEM DESCRIPTION

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Section

EXPLANATORY NOTE

The purpose of the Architectural Design is to record the logical/functional design information for the software. This includes design rationale and trades, the selected architecture of the software including at least one level of decomposition, the relationships and interface description between the levels, and the allocation of the software requirements to lower levels.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   DESIGN APPROACH AND TRADEOFFS

Describe the rationale and tradeoffs, and other design considerations, including any use of prototyping, influencing the major decisions affecting the design of the software. Detailed design engineering and trades information that must be reevaluated or considered when changes are proposed during development or during sustaining engineering should be included in an appendix or explicitly referenced.

4.0   ARCHITECTURAL DESIGN DESCRIPTION

The purpose of this section is to describe the logical or functional design of the software. The following topics should be included:

    a.   Logical or functional decomposition
    b.   Description of the lower level elements including their inputs and outputs
    c.   Relationships and interactions between the lower level elements
    d.   Logical data design - conceptual schema
    e.   Entity/data identification and relationships
    f.   Timing and sequencing
    g.   Implementation constraints

5.0   EXTERNAL INTERFACE DESIGN

This section contains the design specifications for interfaces between the software and its external users. The section should be rolled-out when it will be placed under configuration control as a separate item, such as when two systems are referencing the same interface design. When rolled-out, it becomes the External Interface Design document.

5.1   Interface Design

Describe the design for each interface identified in the requirements section of the Product Specification as an external interface in terms of:

    a.   Information description
    b.   Initiation criteria
    c.   Expected response
    d.   Protocol and conventions
    e.   Error identification, handling, and recovery
    f.   Queuing
    g.   Implementation constraints

5.2   Interface Allocation

The purpose of this section is to allocate the software's external interface requirements to the appropriate lower level elements. Use a table or graphics if appropriate for clarity. Ensure that all external interface requirements, including performance, site adaptation, and design goals, are allocated.

6.0   REQUIREMENTS ALLOCATION AND TRACEABILITY

This section documents the allocation of the software's requirements to the lower level elements. Show the traceability of all requirements including performance and constraints for this software to the design presented above. Explicitly identify any derived requirements.

7.0   PARTITIONING FOR INCREMENTAL DEVELOPMENT

If the software is to be produced using phased delivery or incremental development, specify what requirements and functions are to be satisfied in each increment of the software.

8.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

9.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

10.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

11.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-P400
DETAILED DESIGN
DATA ITEM DESCRIPTION

TABLE OF CONTENTS

Section

EXPLANATORY NOTE

The purpose of the Detailed Design is to record the design information for the
software. This includes design rationale and trade-offs, the selected design of the
software including its decomposition into compilation and code units, the design of
all interfaces, and the mapping between the logical or functional design of the
software and its detailed design units.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of
this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of
this section.

3.0   DETAILED DESIGN APPROACH AND TRADEOFFS

Describe the rationale and tradeoffs, and other design considerations, including any use of prototyping, influencing the major decisions affecting the design of the software. Detailed design engineering and trades information that must be reevaluated or considered when changes are proposed during development or during sustaining engineering should be included in an appendix or explicitly referenced.

4.0   DETAILED DESIGN DESCRIPTION

4.1   Compilation Unit Design and Traceability to Architectural Design

This section presents the overall physical design of the software into its compilation units. The information for each unit should include:

    a.   Compilation unit identification
    b.   Compilation unit descriptions including:
           1.   Inputs and outputs
           2.   Functions
           3.   Data descriptions and relationships
           4.   Diagrams
           5.   Control and signal flow
           6.   Error handling
    c.   Interfaces descriptions between compilation units
    d.   Packaging details such as placement of units in library

This section includes a mapping of or the traceability between the architectural design elements to the compilation units.

4.2 Detailed Design of Compilation Units

This section contains the design information detailed to the level necessary to code the individual compilation units and all lower level code units. The information for each unit should include:

    a.   Detailed design to the lowest level (i.e., module or subroutine)
    b.   Functions or operations
    c.   Algorithms
    d.   Specific data definitions including data conversions
    e.   Local and global data
    f.   Parameters for initiation and adaptation

   g. Logic flow, including:
     1. Control flow
     2. Timing variations
     3. Priority assignments
     4. Interrupt priorities and handling
   h. Error detection and handling
   i. Physical data design:
     1. Internal schema
     2. Query language
     3. Access method
     4. Key, record, and data element definition and structure
     5. Use of database management capability
   j. Device interface

5.0 EXTERNAL INTERFACE DETAILED DESIGN

This section contains the detailed design specifications for interfaces between the software and its external users. The purpose of the software external interface detailed design is to record the physical design information for the external interfaces to the software. This includes the data types, physical data format or layout, message descriptions, data transmissions, and protocols and priorities.

This section should be rolled-out when it is to be placed under configuration control as a separate item, such as when two elements are referencing the same interface design. When rolled-out, it becomes the External Interface Detailed Design document.

5.1 Interface Allocation Design

This section describes the mapping or traceability of the external interface design of the software into its specific compilation units and lower level units.

5.2 Physical Interface Design

Describe each external interface for the software. For each interface, describe the details of the interface, including:

   a. (Interface Name/Identifier) Type and Purpose. Describe the type and purpose of the interface.
   b. Data Transmission. Provide a detailed specification of the data records and elements transmitted across the interface in such terms as:
     1. Unique identifier for each record and data element
     2. Brief description and purpose of each record and data element
     3. Source and destination for each record or single data element transmission

   4. Data type and (if appropriate) unit of measure
   5. Limit and range of values
   6. Accuracy
   7. Precision (in terms of significant digits)

   If shared memory is used, then define:

   8. The purpose for the shared memory
   9. The shared memory location(s) used for transmissions across the interface

 c. Message Descriptions. Identify each message transmitted across the interface and specify the assignment of data elements to each message. Provide cross references between data elements and messages, as a two-way sorted list.

 d. Interface Priority. Specify the relative priority of this interface and of each message transmitted across it.

 e. Communication Protocols. Identify the protocol for the interface by name and describe its technical details in terms of the following:
   1. Fragmentation and reassembly of messages
   2. Message formatting
   3. Error control and recovery procedures, including fault tolerance features
   4. Synchronization, including connection establishment, maintenance, termination, and timing
   5. Flow control, including sequencing, and buffer allocation
   6. Data transfer rate, whether periodic or aperiodic, and minimum interval between transfers
   7. Routing, addressing, and naming conventions
   8. Transmission services, including priority and grade
   9. Status, identification, notification, and other reporting features
   10. Security, including encryption, user authentication, compartmentalization, and auditing

6.0 CODING AND IMPLEMENTATION NOTES

The purpose of this section is to specify information such as:

 a. Stubs for incremental development
 b. Use of compiler options

7.0   FIRMWARE SUPPORT MANUAL

If the software design is implemented in firmware, refer to the Firmware Support Manual DID (NASA-DID-P410) for a further description of the content of this section.

8.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

9.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

10.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

11.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-P410
FIRMWARE SUPPORT MANUAL
DATA ITEM DESCRIPTION

TABLE OF CONTENTS

Section

EXPLANATORY NOTE

The purpose of the Firmware Support Manual is to provide an instruction and
reference manual for the firmware programmer to program, support, maintain, and
monitor firmware that is a part of the software. The Firmware Support Manual
provides the information necessary to program the read-only memory (ROM)
devices, programmable ROMs (PROMs), and erasable PROMs (EPROMs). The
Firmware Support Manual describes the ROM devices and support software and
equipment required for reprogramming.

The Firmware Support Manual does not provide information regarding the design
and implementation (bit pattern) within the device. That information is contained
in the software detailed design section.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of
this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   DEVICES

List the firmware devices and provide the following information for each.

3.1   Physical Description

Provide a complete physical description of ROM components, including as a minimum:

    a.   Memory size (length and width in bits)
    b.   Pin functional descriptions
    c.   Operating characteristics such as access time, power supply/requirements, logic levels
    d.   Logical interfaces (e.g., addressing scheme, chip selection, etc.)
    e.   Available (unused) portion
    f.   Internal and external identification scheme
    g.   Manufacturer's part number
    h.   Timing characteristics (include diagram if appropriate)

3.2   Installation and Replacement

Describe all installation, removal, and replacement procedures for the ROM device. Describe the device addressing scheme and its implementation. If appropriate, use a diagram to describe the board layout that includes a socket number and pin identification for the device.

3.3   Limitations

Describe the operational and environmental limits to which the ROM device may be subjected and still maintain satisfactory operation.

4.0   PROGRAMMING TOOLS

The purpose of this section is to describe the hardware and software tools and procedures for programming the device.

4.1   Equipment

Describe the equipment used for programming the ROM device, including general purpose peripherals and special equipment used for device loading, test, and verification.

Identify each piece of equipment by:

    a.   Manufacturer's name and designation.
    b.   Major functional purpose of the equipment.
    c.   Any unique features.

4.2　Software

Describe the computer software used for programming the ROM device, including utilities, for device loading, burn-in, and test.

Identify each software item by:

    a.   Vendor and vendor's designation, including version number
    b.   Major function in terms of purpose
    c.   Unique features

4.3　Programming Procedures

Describe the procedures used for ROM programming, including:

    a.   Logic data generation
    b.   Device loading
    c.   Reliability aging conditions and schedules
    d.   Test
    e.   Verification

5.0　SECURITY IMPLICATIONS

Describe any special handling or security requirements for the devices or support hardware and software.

6.0　ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

7.0　GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

8.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this
section.

9.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this
section.

NASA-DID-P500
VERSION DESCRIPTION
DATA ITEM DESCRIPTION

TABLE OF CONTENTS

Section

EXPLANATORY NOTE

The purpose of the Version Description is to provide a precise description of the particular version of the software being released. This description includes the version of requirements and design applicable to this version, and an exact description of the product contents in this version. For paper products, the product itself may also be included within the Version Description section, if appropriate.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   PRODUCT DESCRIPTION

Provide a description of this version of the product and use references to the appropriate sections of the requirements or design sections of the Product Specification.

4.0   INVENTORY AND PRODUCT

4.1   Materials Released

This section lists physical materials delivered with the version.

      a.   All media containing code (tapes, disks) that constitute the version and specific formats
      b.   All operation and support documents
      c.   All utility and support software and equipment that is not a part of the version but is required to load, operate, or maintain this version
      d.   All required hardware

4.2   Product Content

Identify the exact configuration of the product delivered by this version. Paper products may be included here in-line or rolled-out into a separate document. For non-paper products or rolled-out document, include a pointer to the product (e.g., model and serial numbers, or a document citation).

For software, indicate the location of the source and object code for this version. Printed listings may be included as an appendix to this document. Executables will normally be included on the tapes (or other medium) listed in the preceding section. Specify the compiler and, if applicable, the assembler, and version of each, used to generate the executable from the source code.

When appropriate, the product description statement will include version descriptions for systems, CSCIs, etc., to the lowest configuration management unit. For example, for a CSCI, it is a statement of the version descriptions of all of the CSCs. For a software system, it is a statement of the version descriptions for all of the next level decomposition items.

5.0   CHANGE STATUS

Describe the capabilities newly installed in this version. Identify the associated approved change, if applicable. Identify any requirements that are known to be unsupported. Also identify any changes in capabilities provided by the previous version, if applicable.

Indicate any interfaces to other software affected by the changes installed in this version, and describe the impact. The following sections identify changes applicable to this version (but not to previous versions) and their status.

5.1   Installed Changes

List, by identifier and title, the changes approved by a configuration control authority or board that have been newly incorporated in this version. Identify any change reports (Engineering Change Proposal, Change Requests, Document Change Notice, etc.) associated with each change.

5.2   Waivers

List all waivers that have been approved for this version and summarize their effects on the version's functional capabilities or operation.

5.3   Possible Problems and Known Errors

Identify and describe the operational effects of each possible problem and known error in the version, together with steps being taken to resolve them and ways for working around them.

6.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

7.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

8.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

9.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-P600
USER'S GUIDE
DATA ITEM DESCRIPTION

TABLE OF CONTENTS

Section

EXPLANATORY NOTE

The purpose of the user's guide is to provide end users (rather than system
operators or administrators) with instructions explaining how to execute
the software effectively.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of
this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of
this section.

3.0   OVERVIEW OF PURPOSE AND FUNCTIONS

Describe the purpose and main capabilities of the software, and state its overall operation in terms of:

      a.   Functions
      b.   Options
      c.   Restrictions and limitations

If appropriate, reference the version description section.

4.0   INSTALLATION AND INITIALIZATION

Explain in detail the procedures for installing, tailoring, and initiating the software, including:

      a.   Equipment set-up
      b.   Power-on and power-off
      c.   Bootstrap and load
      d.   Initiation commands
      e.   Interrupt/recovery/restart
      f.   Initialization of files, variables, or other data
      g.   Tailoring, reconfiguration, adaptation
      h.   Re-initialization after failure

5.0   STARTUP AND TERMINATION

Describe how to start and terminate operation normally, and how to determine whether normal termination has occurred.

If the user has some control over abnormal termination, describe the procedures involved such as:

      a.   Trouble indicators and corrective actions
      b.   On-line interventions
      c.   Trap recovery
      d.   Operating communications
      e.   Fault isolation techniques
      f.   Conditions requiring software abort or equipment shut-down

Describe procedures for restarting after both normal and abnormal termination. If recovery procedures are required for restarting after abnormal termination, explain them in terms of:

    a.   Check points
    b.   Collection of failure data
    c.   Restoring files
    d.   Restoring devices to operational mode

6.0   FUNCTIONS AND THEIR OPERATION

Describe each function in terms of:

    a.   Purpose of function
    b.   Step-by-step procedures for execution
    c.   User inputs: commands, data, and option selection
    d.   Expected results and the procedures for examining these results
    e.   Related functions

Describe any inputs from a source other than the user that may occur while the software is in use and that may affect its interface with the user (for example, inputs from a remote sensor). Include applicable attributes of the input such as format, frequency, and effect upon the software state or mode.

7.0   ERROR AND WARNING MESSAGES

List and explain each possible error condition and associated message that may be encountered. Describe the corresponding corrective actions to be taken.

If appropriate, identify an agency that may be called upon for assistance.

8.0   RECOVERY STEPS

Explain recovery procedures the user may employ.

9.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

10.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

11.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

12.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-P700
OPERATIONAL PROCEDURES MANUAL
DATA ITEM DESCRIPTION

TABLE OF CONTENTS

Section

EXPLANATORY NOTE

The purpose of the operational procedures manual is to document the actual operational procedures of the software.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   SYSTEM PREPARATION AND SET-UP PROCEDURES

This section describes the procedures conducted by the operator to set-up and prepare the system for operation, both initially and for new releases or modifications to the system. This includes instructions for both software and, as appropriate, hardware.

4.0   STANDARD OPERATING PROCEDURES

This section describes the detailed operational procedures that are part of the standard practices for operating the information system. The types of procedures defined here include:

      a.   Monitoring procedures
      b.   Daily operating procedures, such as system back-ups and logs for maintenance
      c.   Standard safety and security procedures
      d.   On-demand procedures, such as in response to a user request

5.0   FAULT AND RECOVERY PROCEDURES

This section describes the detailed operational procedures to be conducted in case of a fault or abnormal condition in the hardware, software, or some other aspect of the system. The immediate actions and subsequent recovery procedures are documented for every anticipated fault condition.

6.0   EMERGENCY PROCEDURES

This section describes the detailed operational procedures to be conducted in case of an emergency. The types of procedures defined here include:

      a.   Procedures for critical system failures
      b.   Environmental emergency procedures, such as fires or hurricanes
      c.   Safety or security emergency procedures

7.0   DIAGNOSTIC PROCEDURES

Explain diagnostic procedures the operator may employ such as:

      a.   Correlation to error messages
      b.   Diagnostic initialization
      c.   Recording diagnostic data
      d.   Analysis of diagnostic results

8.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

9.0   GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

10.0   NOTES

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

11.0   APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

APPENDIX E

ASSURANCE AND TEST PROCEDURES DATA ITEM DESCRIPTIONS

This appendix contains the specifications for the format, outline, and content of the Assurance and Test Procedures and rolled-out sections. Major sections of the Assurance and Test Procedures have been rolled-out into separate Data Item Descriptions (DIDs) using the template DID (NASA-DID-999) for purposes of clarity and manageability.

The Assurance and Test Procedures DIDs provide outlines for the complete Assurance and Test Procedures. Major sections of the Assurance and Test Procedures point to lower level DIDs that contain more detailed descriptions of these major sections.

The number of Assurance and Test Procedures documents generated does not have to match the number of DIDs presented in this section. Lower-level detailed DIDs provide additional substructure and contain content discussion which should be reviewed even when the content is recorded in-line (i.e., not rolled-out).

The detailed DIDs in this appendix may be used as they stand to produce separate documents of the Assurance and Test Procedures.

Note that the DIDs for the Assurance Procedures (NASA-DID-A100) and the Test Procedures (NASA-DID-A200) are to be used multiple times for various sections of Assurance and Test Procedures.

Table E-1. DID Index (Numeric Order)

Table E-2. Complete DID Set for Assurance and Test Procedures

NASA-DID-A000	Assurance and Test Procedures
NASA-DID-A100	Quality Assurance Procedures
	Verification and Validation Procedures
NASA-DID-A100	Inspection, Review, and Analysis Procedures
	Testing Procedures
NASA-DID-A200	Unit Test Procedures
NASA-DID-A200	Integration Test Procedures
NASA-DID-A200	Acceptance Test Procedures
NASA-DID-A100	Quality Engineering Assurance Procedures
NASA-DID-A100	Safety Assurance Procedures
NASA-DID-A100	Security and Privacy Assurance Procedures
NASA-DID-A200	Certification Procedures

NASA-DID-A000
ASSURANCE AND TEST PROCEDURES
DATA ITEM DESCRIPTION

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Section

EXPLANATORY NOTE

The purpose of the Assurance and Test Procedures is to document all of the technical procedures (such as test or assurance procedures) used to assure software. The types of assurance and the organizations responsible for performing that assurance activity are specified in the Management Plan. In particular, Independent Verification and Validation (IV&V) organizations will be tasked to produce separate Assurance and Test Procedures for their activities using this DID.

1.0   INTRODUCTION

Refer to the template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   QUALITY ASSURANCE

The purpose of this section is to document the objective of, and procedures for, quality assurance (QA) activities specified in the Assurance Plan section of the Management Plan, including reviews and audits for the purpose of evaluating quality. In general, QA activities focus on conformance to standards, procedures, and plans.

Use the Assurance Procedures DID (NASA-DID-A100) for each QA activity. Document all reports from each activity in the Management, Engineering, and Assurance Reports using the Audit Report DID (NASA-DID-R002) or Assurance Activity Report DID (NASA-DID-R008) or both.

4.0   VERIFICATION AND VALIDATION

The purpose of this section is to document the objective of, and procedures for, verification and validation (V&V) activities specified in the Assurance Plan section of the Management Plan.

4.1   Inspections, Reviews, and Analyses

The purpose of this section is to document the objective of, and procedures for, V&V activities specified in the Assurance Plan section of the Management Plan, including inspections or walkthroughs, phase transition reviews, and static analyses, such as code evaluation or algorithm analysis.

Use the Assurance Procedures DID (NASA-DID-A100) for each V&V activity. Document all reports from each activity in the Management, Engineering, and Assurance Reports using the Inspection Report DID (NASA-DID-R003), the Review Report DID (NASA-DID-R011), and/or the Assurance Activity Report DID (NASA-DID-R008), as applicable.

4.2   Testing

The purpose of this section is to document the test objectives, procedures, criteria, expected results, and actual results of tests to demonstrate that the software meets requirements and is acceptable. Separate subsections will be generated for each level of testing (such as unit, integration, and acceptance) specified in the Assurance Plan section of the Management Plan and for each major group of tests within a testing level.

The primary topics of each testing subsection include:

    a.   Test identification and objective
    b.   Test criteria and procedures
    c.   Test cases and expected results
    d.   Actual test results

4.2.1   Unit Testing

The purpose of this section is to document the test objectives, procedures, criteria, expected results, and actual results of unit tests. The procedures for unit tests are based on, and are intended to verify, the detailed design.

For each major group of unit tests, a subsection detailed according to the Test Procedures DID (NASA-DID-A200) should be generated. Summaries of test results should be recorded in the Test Report DID (NASA-DID-R009).

4.2.2   Integration Testing

The purpose of this section is to document the test objectives, procedures, criteria, expected results, and actual results of integration tests. The procedures for integration tests are based on the detailed design wherever two or more software entities (CSUs, CSCs or CSCIs) are combined for testing (i.e., the level of the architectural design).

For each major group of integration tests, a subsection detailed according to the Testing Procedures DID (NASA-DID-A200) should be generated. Summaries of test results should be recorded in the Test Report DID (NASA-DID-R009).

4.2.3   Acceptance Testing

The purpose of this section is to document the test objectives, procedures, criteria, expected results, and actual results of acceptance tests. The procedures for acceptance tests are based on the functional and acceptance requirements for that entity of software (CSU, CSC, or CSCI).

For each major group of acceptance tests, a subsection detailed according to the Testing Procedures DID (NASA-DID-A200) should be generated. Summaries of test results should be recorded in the Test Report DID (NASA-DID-R009).

5.0   QUALITY ENGINEERING ASSURANCE

The purpose of this section is to document the objective of, and procedures for, quality engineering (QE) activities specified in the Assurance Plan section of the Management Plan, including the assurance of reliability, maintainability, and other quality factors.

Use the Assurance Procedures DID (NASA-DID-A100) for each QE activity. Document all reports from each activity in the Management, Engineering, and Assurance Reports using the Assurance Activity Report DID (NASA-DID-R008).

6.0   SAFETY ASSURANCE

The purpose of this section is to document the objective of, and procedures for, safety assurance activities specified in the Assurance Plan section of the Management Plan.

Use the Assurance Procedures DID (NASA-DID-A100) for each safety assurance activity. Document all reports from each activity in the Management, Engineering, and Assurance Reports using the Assurance Activity Report DID (NASA-DID-R008).

7.0   SECURITY AND PRIVACY ASSURANCE

The purpose of this section is to document the objective of, and procedures for, security and privacy assurance activities specified in the Assurance Plan section of the Management Plan.

Use the Assurance Procedures DID (NASA-DID-A100) for each QA activity. Document all reports from each activity in the Management, Engineering, and Assurance Reports using the Assurance Activity Report DID (NASA-DID-R008).

8.0   CERTIFICATION

The purpose of this section is to document the test objectives, procedures, criteria, expected results, and actual results of tests for all certification tests, as specified in the Assurance Plan section of the Management Plan, to demonstrate that the software meets requirements and is acceptable. (Note that certification is typically done only at the CSCI or system level.)

Use the Testing Procedures DID (NASA-DID-A200) for each certification test. Summaries of certification test results should be recorded in the Certification Report DID (NASA-DID-R001).

9.0   ABBREVIATIONS AND ACRONYMS

Refer to the template DID (NASA-DID-999) for a detailed structure and content description of this section.

10.0   GLOSSARY

Refer to the template DID (NASA-DID-999) for a detailed structure and content description of this section.

11.0   NOTES

Refer to the template DID (NASA-DID-999) for a detailed structure and content description of this section.

12.0   APPENDICES

Refer to the template DID (NASA-DID-999) for a detailed structure and content description of this section.

NASA-DID-A100
ASSURANCE PROCEDURES
DATA ITEM DESCRIPTION

TABLE OF CONTENTS

Section

EXPLANATORY NOTE

The purpose of the Assurance Procedures section is to record the objectives, procedures, and other technical information related to assurance activities for either a product or a process.

NOTE: This DID is used multiple times to document Quality Assurance, Verification and Validation, Quality Engineering Assurance, Safety Assurance, and Security and Privacy Assurance activities.

1.0   INTRODUCTION

Refer to the template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   OBJECTIVES

Specify the objectives of the assurance activity and the specific quality attributes for which it is being evaluated. Trace the assurance activities to the appropriate section of the Assurance Plan section of the Management Plan where the plans have been described and methods to be employed have been stated. When appropriate, trace

assurance activities to either the appropriate Requirements or Design section(s) of the Product Specification or process description(s) in the Management Plan.

4.0   PROCEDURES

Describe the details required to conduct the specific assurance activity. Describe the overall criteria used for evaluation of this activity. When appropriate, provide a range of acceptability or numeric measures. Describe the specific measurement criteria against which the product or process is to be evaluated, such as a checklist.

5.0   ABBREVIATIONS AND ACRONYMS

Refer to the template DID (NASA-DID-999) for a detailed structure and content description of this section.

6.0   GLOSSARY

Refer to the template DID (NASA-DID-999) for a detailed structure and content description of this section.

7.0   NOTES

Refer to the template DID (NASA-DID-999) for a detailed structure and content description of this section.

8.0   APPENDICES

Refer to the template DID (NASA-DID-999) for a detailed structure and content description of this section.

NASA-DID-A200
TEST PROCEDURES
DATA ITEM DESCRIPTION

TABLE OF CONTENTS

Section

EXPLANATORY NOTE

The purpose of a Test Procedures section is to record the objectives, procedures, results, and other technical information related to a test or a group of tests. The title of the section or document should indicate the level and, if appropriate, type of test and the product being tested.

This Test Procedures DID is applicable at all levels of testing (unit, integration, acceptance, and certification) and for software testing. The DID is used either as a separate document or in-line for each test or group of tests associated with a specific level of testing.

Different categories of testing may be performed by either an engineering or assurance organization. While testing does assure a product, it may be a large undertaking, which requires the development of its own set of products, such as test procedures and test cases. Whether test products are developed by an engineering or assurance organization, provisions should also be made to have assurance performed on the test products.

NOTE: This DID is use multiple times to document Unit, Integration, Acceptance, and Certification tests.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of this section.

3.0   TEST IDENTIFICATION AND OBJECTIVE

Identify the test or set of tests. Provide a link between this test section and the tests specified in the Assurance Plan section of the relevant Management Plan for this software.

Describe the test objectives. For example, for software unit testing, one test objective is to demonstrate that the detailed design has been correctly represented in the code. For acceptance testing, the objective might be to determine that the system meets a selected set of requirements from the Product Specification.

Describe the specific sections of the Product Specifications (Requirements, Design, etc.) that are to be demonstrated by this test. This specification should provide the appropriate traceability in the Product Specification. (i.e., to Detailed Design for Unit Test, to Architectural Design for Integration Test, to Requirements for Acceptance Test).

4.0   PROCEDURES

Describe the procedures necessary to support the test(s) in terms such as:

a. Specification of environment (support software, hardware, simulators, models, etc., required to support this test)
b. Installation of probes for collecting test data
c. Initialization of environment and software to be tested, such as setting flags, breakpoints, pointers, data, or control parameters
d. Use of test tools such as test generator(s)
e. Data recording or reduction procedures or measurement techniques
f. Any special instructions for the test
g. Action(s) to be taken by test operator particularly in the case of failures
h. Recovery action to be taken in the event of an anomaly

Describe the test case(s) to be used in this test or set of tests in terms such as:

      a.   Input name, value, and source including user inputs
      b.   Required environment such as database(s) and database(s) contents
      c.   Timing or event sequence such as a scenario

5.0   EVALUATION CRITERIA

Describe the criteria used to determine the success or failure of the test(s) in terms such as:

      a.   Accuracy
      b.   Precision
      c.   Limits and range boundaries
      d.   Response time
      e.   Acceptable failure rate by classes of failure

6.0   EXPECTED RESULTS

Describe the expected results from the test(s) in terms such as:

      a.   Output name and value including messages or displays
      b.   Event sequence or timing
      c.   Resource consumption such as time, power, or storage

If this information is available in electronic form, it should be maintained in that form for possible future regression testing.

7.0   ACTUAL RESULTS

Identify the particular version of the product tested and the specifics of the environment (support software, hardware, etc.) in which it was tested and the actual test date. Describe the actual results from the test(s). The content and format of this section should mirror that of expected test results for ease of comparison.

A statement of the success or failure of this test or set of tests based on the criteria defined in Section 5.0 is given in a test report to management. The relevant test report (or set of reports) should be referenced in this section.

8.0   ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

9.0 GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

10.0 NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

11.0 APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

APPENDIX F

MANAGEMENT, ENGINEERING, AND ASSURANCE REPORTS DATA ITEM DESCRIPTIONS

This appendix contains the specifications for the format, outline, and content of the Management, Engineering, and Assurance Reports. The minimum content for report types designated in the document is identified, but the exact format and content for the reports themselves must be specified in the Management Plan.

The Management, Engineering, and Assurance Report DID (NASA-DID-R000) provides an outline for the complete Management, Engineering, and Assurance Reports. Any section or subsection of this DID may be rolled-out into a separate document.

NASA-DID-R000
MANAGEMENT, ENGINEERING, AND ASSURANCE REPORTS
DATA ITEM DESCRIPTION

TABLE OF CONTENTS

Section

EXPLANATORY NOTE

The purpose of the Management, Engineering, and Assurance Reports is to
provide a logical home for all reports specified in the Management Plan and
generated throughout the life cycle. This document provides a mechanism for
storing and retrieving each individual report.

1.0   INTRODUCTION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of
this section.

2.0   RELATED DOCUMENTATION

Refer to the Template DID (NASA-DID-999) for a detailed structure and content description of
this section.

3.0   REPORTS

The purpose of this section is to provide a logical home or master index for all reports as specified
in the Management Plan. The actual mechanism to control and store all the reports is determined
by the project manager. For example, the reports may be physically placed in this document or
this document may contain only a description of each report type and index and location
information for the actual reports for each report type.

This section is organized by applicability classification of the report type:

    a.   Management reports to the Management Plan
    b.   Assurance reports to the Assurance and Test Procedures
    c.   Engineering reports to the Product Specification

Under each applicability subsection, for each report type, the following information should be provided:

    a.   Report title
    b.   Section of the Management Plan that specifies this report is to be generated
    c.   Index of reports that have been generated (or pointer to an on-line index of same)
    d.   Actual reports (or identification of where reports are stored)

If there is an organizational partitioning of responsibilities, then the reports may first be grouped by organizational responsibility and then by management, assurance, and engineering type.

4.0 ABBREVIATIONS AND ACRONYMS

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

5.0 GLOSSARY

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

6.0 NOTES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

7.0 APPENDICES

Refer to the Template DID (NASA-DID-999) for a detailed description of content for this section.

NASA-DID-R001
MINIMUM CONTENTS FOR CERTIFICATION REPORT

EXPLANATORY NOTE

The purpose of the Certification Report is to present to management a summary of certification activity results for a product or group of products. The requirements for the specific certification activity and associated reports and the frequency of their generation are specified in the Management Plan. The description of the supporting test(s) (test specifications, test data, test results, etc.) and other assurance activities is given in the Assurance and Test Procedures. The description of the product being certified is given in the Product Specification.

The information listed below is considered to be the minimum content for a Certification Report. The specific content and format for this report is specified in the Management Plan.

Topics to be included in the Certification Report are:

a. Identity of the certification activity as defined in the Assurance and Test Procedures
b. Version identification of product under certification as defined in the Product Specification plus any environment definition
c. Date of certification activity
d. Certification team members (if appropriate)
e. Certification witnesses (if appropriate)
f. Agency granting certification
g. Status of certification activity
   1. Status of activity
   2. Certification criteria unfulfilled
   3. Limitations restricting or precluding certification

NASA-DID-R002
MINIMUM CONTENTS FOR AUDIT REPORT

EXPLANATORY NOTE

The purpose of the Audit Report is to provide status on an audit activity to management. The requirement for the audit activity and associated reports and the frequency of their generation are specified in the Management Plan. The description of an audit activity is given in the Assurance and Test Procedures. An audit may apply to either a product or a process. The information listed below is considered to be the minimum content for an Audit Report. The specific content and format for this report is specified in the Management Plan.

Topics to be included in the Audit Report are:

a.   Identity of the audit as defined in the Assurance and Test Procedures
b.   Version identification of product or process under audit and any environment identification
c.   Date of audit
d.   Audit team members (if appropriate)
e.   Anomalous conditions encountered and recommendations made
f.   Audit summary and status
g.   Date of follow-up audit

NASA-DID-R003
MINIMUM CONTENTS FOR INSPECTION REPORT

EXPLANATORY NOTE

The purpose of the Inspection Report is to provide the status of an inspection to management. The requirement both for the inspection activity and for associated reports and the frequency of their generation are specified in the Management Plan. The description of the inspection criteria, etc., is given in the Assurance and Test Procedures. The description of the product being inspected is given in the Product Specification. The information listed below is considered to be the minimum content for an inspection report. The specific content and format for this report is specified in the Management Plan.

Topics to be included in the Inspection Report are:

a.   Identity of the inspection as defined in the Assurance and Test Procedures
b.   Version identification of the product under inspection as defined in the Product Specification plus environment identification
c.   Date of inspection
d.   Inspection team members
e.   Anomalous conditions encountered and recommendations made
f.   Inspection status and summary of results

NASA-DID-R004
MINIMUM CONTENTS FOR DISCREPANCY (NRCA) REPORT

EXPLANATORY NOTE

The purpose of the Discrepancy (NRCA) Report is to state a discrepancy to a product or Product Specification. The process of filing a report of this type may be referred to as nonconformance reporting and corrective action (NRCA). A nonconformance is defined as any deviation of a product or process from applicable requirements, standards, or procedures. The requirement for reports of this type and the process for analysis and disposition is specified in the Management Plan. The information listed below is considered to be the minimum content for a Discrepancy (NRCA) report.

Topics to be included in the Discrepancy (NRCA) report are:

      a.   Report identification (Discrepancy Report or NRCA number)
      b.   Originator identification including
            1.   Name and organization
            2.   Address and phone
            3.   Unit or site of occurrence
      c.   Product identification including
            1.   Name
            2.   Version number (plus release date if applicable)
            3.   If applicable, environment information (e.g., hardware and operating system for a software product)
            4.   Life cycle phase in which nonconformance detected
      d.   Discrepancy Report (NRCA) information including
            1.   Title
            2.   Date
            3.   Type of nonconformance
            4.   Description
            5.   Recommendation for proposed solution (if any), including code, data, or documentation where corrective action must be taken
      e.   Approval authority including
            1.   Criticality
            2.   Disposition
            3.   Resolution
            4.   Implementation schedule
            5.   Date/version of the item in which the corrective action will be included
            6.   Authority signature
            7.   Date tested
            8.   Date of closure

NASA-DID-R005
MINIMUM CONTENTS FOR ENGINEERING CHANGE PROPOSAL

EXPLANATORY NOTE

The purpose of the Engineering Change Proposal (ECP) is to state a suggested change to a product. The requirement for use of ECPs and the process for their analysis and disposition is specified in the Management Plan. The information listed below is considered to be the minimum content for an ECP. The specific format for the ECP Report to be used is specified in the Management Plan.

Topics to be included in the ECP are:

- a. Proposal identification
- b. Originator identification including
    1. Name and organization
    2. Address and phone
- c. Product (including documents) identification including
    1. Name or title
    2. Version number (plus release date if applicable)
    3. If applicable, environment information (e.g., hardware and operating system for a software product)
- d. Proposal information including
    1. Title
    2. Date
    3. Classification (e.g., major or minor)
    4. Priority
    5. Description of proposed change
    6. Recommendation (if any)
- e. Proposal analysis including
    1. Classification
    2. Resources required to implement change
    3. Effect upon operational personnel and training
    4. Suggested resolution
    5. Reference to associated analysis
- f. Change authority including
    1. Disposition
    2. Resolution
    3. Implementation schedule
    4. Authority signature

NASA-DID-R006
MINIMUM CONTENTS FOR LESSONS LEARNED REPORT

EXPLANATORY NOTE

The purpose of the Lessons Learned Report is to record, for the purpose of improvement in future applications, the major strengths and weaknesses of the management, engineering, and assurance process for an application, and the resultant product. This is not an evaluation of the current application; rather, it is a distillation of the experience gained that will be useful when applied to similar activities in the future.

Topics to be included in the Lessons Learned Report are lessons learned on matters such as:

a.   Author or submitter
b.   Identification of software
c.   Unique approaches for methods, practices, and standards
d.   Useful management planning and control techniques
e.   Major problem areas and how resolution was attained; identification of unresolved problems
f.   Successful aspects and shortcomings of the planning, development, and assurance process
g.   Recommendation for future applications

NASA-DID-R007
MINIMUM CONTENTS FOR PERFORMANCE/STATUS REPORTS

EXPLANATORY NOTE

The purpose of the Performance/Status Report is to inform management about the performance or status of a process or product. The requirement for reports of this type and their frequency are specified in the Management Plan. The information listed below is considered the minimum content for a Performance or Status Report. The specific content and format is specified in the Management Plan.

Topics to be included in performance/status reports are:

a.   Identification of activity or process to which this report relates
b.   Author or submitter
c.   Accomplishments
d.   Significant variances in planned versus actual performance
e.   Open items, problems, newly identified risks, and status on previously reported risks.
f.   Recommendations for corrective action

NASA-DID-R008
MINIMUM CONTENTS FOR ASSURANCE ACTIVITY REPORT

EXPLANATORY NOTE

The purpose of the Assurance Activity Report is to record the conduct and status of a formal or informal review, walkthrough, inspection, analysis, or similar product assurance activity, as specified in the Management Plan. A description of the assurance activity is documented in the Assurance and Test Procedures. The specific content and format for this report is specified in the Management Plan.

Topics to be included in a Assurance Activity Report are:

a. Identification of the activity as specified in the Assurance and Test Procedures
b. Identification of the product or process evaluated
c. Identification of the organization or person responsible for the product or process
d. Date and place of the assurance activity
e. List of assurers and organizations represented
f. Summary of activity results and status
g. List of actions to be taken, and by whom, as determined during the activity
h. Approval action and authority taken as a result of the activity

NASA-DID-R009
MINIMUM CONTENTS FOR TEST REPORT

EXPLANATORY NOTE

The purpose of the Test Report is to provide the status of a test or a sequence of tests to management. The requirement for the tests and reports of this type and the frequency of their generation are specified in the Management Plan. The description of the test (test specifications, test data, test results, etc.) is given in the Assurance and Test Procedures. The description of the product tested is given in the Product Specification. The information listed below is considered to be the minimum content for a Test Report. The specific content and format for this report is specified in the Management Plan.

Topics to be included in the Test Report are:

     a.   Identity of the test as defined in the Assurance and Test Procedures
     b.   Version identification of product under test as defined in the Product Specification
     c.   Date of test
     d.   Test team members (if appropriate)
     e.   Test witnesses (if appropriate)
     f.   Anomalous conditions encountered and recovery procedures attempted
     g.   Test status and summary of results

NASA-DID-R010
MINIMUM CONTENTS FOR WAIVER/DEVIATION REQUEST

EXPLANATORY NOTE

The purpose of the Waiver/Deviation Request is to obtain a waiver or deviation from a required process or product. The requirement for requests of this type and the process for analysis and disposition are specified in the relevant Management Plan (or parent plan). The information listed below is considered to be the minimum content for a Waiver/Deviation Request. The specific content and format for this request is specified in the Management Plan.

Topics to be included in the waiver/deviation request are:

- a. Waiver/deviation identification
- b. Requester identification including
  - 1. Name and organization
  - 2. Address and phone
- c. Product or process identification including
  - 1. Name
  - 2. Version number (release date if applicable)
- d. Waiver/deviation description
- e. Rationale for acceptance of waiver/deviation
- f. Schedule, cost, or other resources impact analysis
- g. Safety, security, or other risk analysis
- h. Change authority including
  - 1. Disposition
  - 2. Resolution
  - 3. Implementation schedule
  - 4. Authority signature

NASA-DID-R011
MINIMUM CONTENTS FOR REVIEW REPORT

EXPLANATORY NOTE

The purpose of the Review Report is to provide the status of a formal review to management. The requirement both for the review activity and for associated reports and the frequency of their generation are specified in the Management Plan. The description of the review criteria, etc., is given in the Assurance and Test Procedures. The description of the product being inspected is given in the Product Specification. The information listed below is considered to be the minimum content for a review report. The specific content and format for this report is specified in the Management Plan.

Topics to be included in the Review Report are:

a.   Identity of the review as defined in the Assurance and Test Procedures
b.   Version identification of the product under review as defined in the Product Specification plus environment identification
c.   Date of review
d.   Review participants
e.   Errors, discrepancies, and omissions encountered and recommendations made
f.   Review status and summary of results
g.   Date of follow-up review