

Kennedy NASA Procedural Requirements

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KSC Configuration Management Procedural Requirements

**National Aeronautics and
Space Administration**

John F. Kennedy Space Center

KDP-KSC-T-2120, Rev. Basic

CHANGE LOG

Date	Revision	Description
8/30/04	Basic	Initial Release. Replaced KNPG 8040.1
1/26/09	A	Content and structure was updated to comply with NPR 1400.1, NASA Directives and Charters Procedural Requirements. Changed Responsible Office from Safety and Mission Assurance to Engineering and Technology Directorate. Updated P.2, Applicability and Scope, to include Figures 1 and 2 to depict hierarchy of Agency CM requirements Updated P.4, Applicable Documents, to remove S&MA documents, program-specific documents (Shuttle & ISS), and add NASA CM Standard, NASA-STD-0005. Updated Sections 1, 2, and 3 to reflect the latest NASA policy in CM best practices and requirements. Moved Definitions from Preface to Appendix A, moved Acronyms from Preface to Appendix B, and added Appendix C to provide outline of major elements of CM.
1/26/16	B	Revalidated with administrative changes to content and structure to comply with NPR 1400.1; updated Change Log, organization titles due to KSC reorganization, and removed/replaced occurrences of NASA-STD-0005 (with EIA-649-B / 649-2) due to superseding, see NASA's Standards and Technical Assistance Resource Tool.
7/28/2020	C	Content and structure was updated to comply with NPR 1400.1, NASA Directives and Charters Procedural Requirements. Changed Responsible Office to Office of the Center Director. Updated document to add KSC Center-level CM Authority, KSC CM Working Group, specify new and clarify existing requirements, provide tailoring instructions, and update to align with Agency endorsed SAE EIA-649 and EIA-649-2. Updated entire document with requirements identified in Appendix E. Updated Section 1 through 3 to specify new and clarify existing requirements. Added Section 3.3 to provide Definition of Project Scope. Changed Appendix C from Configuration Management Elements to Reference Documents.

Date	Revision	Description
		Added Appendix D for with guidance on CCM and CCBs to KSC organizations and contractors' roles and responsibilities, processes, products, and outcomes.
		Added Appendix E for requirements Compliance Matrix.
10/20/2020	C-1	Updated P.2 format.
		Corrected spelling and grammar errors in Section 1 and Section 2.
		Updated links to documents and standards.

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PREFACE

P.1 Purpose

This Kennedy NASA Procedural Requirements (KNPR) establishes the minimum requirements for Configuration and Technical Data Management (CTDM) at the John F. Kennedy Space Center (KSC) and its component Facilities. These requirements apply to Facilities, Systems, Equipment and Utilities (FSEU), and defines KSC-specific Configuration Management (CM) requirements.

P.2 Applicability

a. The provisions of this KNPR apply to all organizational elements and Programs at KSC and their associated contractors and launch service providers (to the extent specified in their contracts). The provisions of this KNPR apply to the interface(s) of other Government agencies and their contractors operating at KSC (that have interfaces) with KSC or Program controlled facilities or equipment. The requirements of this KNPR apply to entities operating in KSC Industrial Operations Zones, partners and tenants to the extent specified in their governing agreements. This KNPR is also applicable at KSC facilities where KSC organizations have been designated design, operational, maintenance, or sustaining engineering responsibility.

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

c. In this directive, all document citations are assumed to be the latest version unless otherwise noted.

d. In this directive, requirements are identified as [CM-XX] with rationale provided in [Appendix E](#).

e. This KNPR applies to the various KSC activities for facilities, systems, and equipment (as defined in [KSC-DE-512-SM, Facility Systems, Ground Support Systems, and Ground Support Equipment General Design Requirements](#)) summarized in the table below:

Table P.1 CM Requirements Applicability

Activity	CM Requirements Enforced
Program controlled design of Ground Systems (GS) and facilities at KSC and its component facilities	Program requirements ¹ apply
Program controlled sustaining engineering design, operations and maintenance at KSC and its component facilities interfacing with non-program controlled systems or equipment	Program requirements ¹ apply
KSC controlled design of GS, institutional facilities, and information technology at KSC and its component facilities	KNPR 8040.1, KNPR 8830.1 , NPR 7120.5 ² , NPR 7120.7 ³
Non-program controlled operations in institutional facilities at KSC and its component facilities interfacing with real property under another organizations control	KNPR 8040.1, KNPR 8830.1 , NPR 7120.5 ² , NPR 7120.7 ³ , NPR 7120.8 ⁴

¹ Program/Project and organization-specific CM requirements must be negotiated, reconciled and implemented in compliance with Agency and Institutional CM requirements with the results documented in the Program/Project/Organizational CM Plan

² NPR 7120.5 is a requirement for Space Flight facilities, programs, and projects only.

³ NPR 7120.7 is applicable to NASA Headquarters and NASA Centers, including Component Facilities and Technical and Service Support Centers.

⁴ NPR 7120.8 is applicable to NASA Research and Technology Program and Project Management Requirements.

f. All organizations shall ensure and verify that the necessary level or degree of CM is being applied in order to define, control changes, and ensure each Configuration Item's (CIs) physical and/or functional configuration is correct, and is commensurate with applicable institutional, program, project, organizational CM and Safety and Mission Assurance (SA) requirements [CM-01].

g. NASA CM requirements derived from SAE EIA-649 and planning policies and standards hierarchy are depicted in [Figures 1 and 2](#), showing the flow down of NASA CM policy including its requirements and implementing guidance of the handbooks. NASA programs/projects/ Centers shall be responsible for developing and managing CM requirements [CM-02] ([see Chapter 2](#)), and Suppliers must develop Configuration Management Plans (CMPs) with implementing processes and procedures to meet these requirements as illustrated in [Figure 2](#).

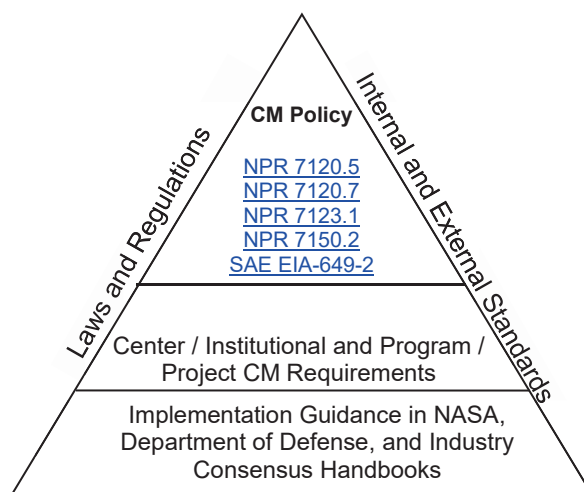


Figure 1 NASA CM Requirement

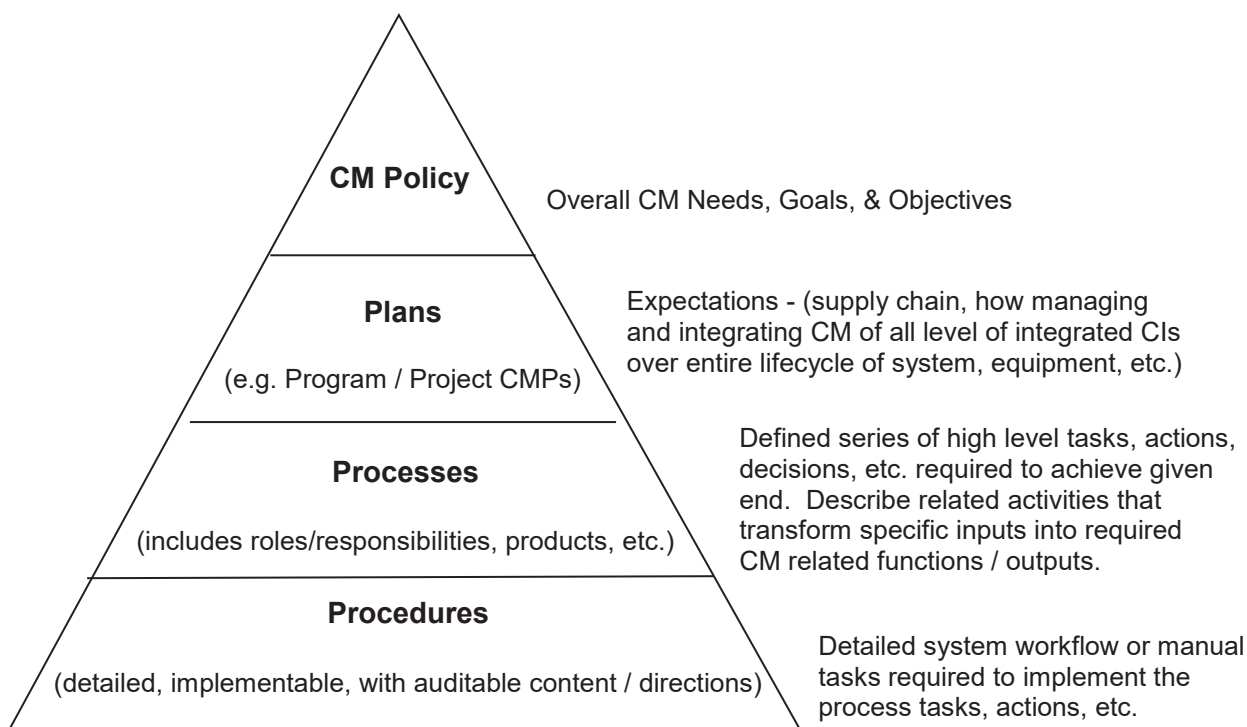


Figure 2 CM Plan Development

P.3 Authority

- a. [NASA Procedural Directives \(NPD\) 7120.4, NASA Engineering and Program/Project Management Policy](#)
- b. [NASA Procedural Requirements \(NPR\) 7120.5, NASA Space Flight Program and Project Management Processes and Requirements](#)
- c. [NPR 7120.7, NASA Information Technology and Institutional Infrastructure Program and Project Management Requirements](#)
- d. [NPR 7120.8, NASA Research and Technology Program and Project Management Requirements](#)
- e. [NPR 7123.1, NASA Systems Engineering Processes and Requirements](#)
- f. [NPR 7150.2, NASA Software Engineering Requirements](#)

P.4 Applicable Documents and Forms

- a. [NPD 8710.5, Policy for Pressure Vessels and Pressurized Systems](#)
- b. [NPR 1441.1, NASA Records Retention Schedules](#)
- c. [NPR 8715.3, NASA General Safety Program Requirements](#)
- d. [NPR 8820, Facility Project Requirements](#)
- e. [KNPR 8830.1, Facilities and Real Property Management Procedural Requirements](#)
- f. [Kennedy Documented Procedures \(KDP\)-P-2713 Technical Reviews, Technical Review Process](#)
- g. [KTI-8040.1 CM POCs, KSC Configuration Management POCs by Organization](#)
- h. [C-0110, KSC Configuration Management Working Group](#)
- i. [KSC-DE-512-SM, Facility Systems, Ground Support Systems, and Ground Support Equipment General Design Requirements](#)
- j. [NASA-STD-8719.7, Facility System Safety Guidebook](#)
- k. [SAE EIA-649, Configuration Management Standard](#)

P.5 Measurement/Verification

None

P.6 Cancellation

This revision cancels KNPR 8040.1, Rev. C, KSC Configuration Management Procedural Requirements.

/original digitally signed by/

Burton R. Summerfield
Associate Director, Management

Distribution: TechDoc Library

CHAPTER 1. CONFIGURATION MANAGEMENT PROGRAMS

At KSC and component facilities, the application of CM across processes, products, and throughout the system life cycle ensures that the correct information is available to support design, development, testing, maintenance operation, and sustaining of systems throughout their life. At KSC and its component facilities, CM is required for developing, modifying, sustaining, storing, operating and maintaining, or interfacing with: flight and related mission support equipment, ground and flight support equipment (hardware and software), the interfaces that they share, FSEU, and other design controlled systems and equipment. Effective CM is essential in supporting a multiuser spaceport, enabling both Government and commercial Spaceport partners to cohesively execute their successful missions.

1.1 General

1.1.1 For the purposes of this KNPR, the term supplier refers to an organization that provides products or services to another organization (the customer). Suppliers or customers may be Government, KSC contractors, Spaceport partners, academia, or external to KSC. Supplier organizations may provide facilities, systems, equipment, data, or other products to customer organizations either by physical or electronic delivery or through an interface (e.g. power or other commodities). KSC supplier organizations and support contractors shall have CM plans and/or processes documenting their CM and CTDM practices and responsibilities related to the services and products they provide to customers, how they ensure consistency between the product and product configuration information, as well as how their CM and CTDM practices support customer CM and CTDM [CM-03].

1.1.2 KSC organizations execute CM in various ways depending on the hardware or software item's requirements and usage. KSC Space Flight projects and programs shall implement their CM programs in accordance with [Table P.1](#), as well as any other contractual requirements [CM-04]. Non-Space Flight projects, functions and tasks can use the aforementioned table and the information in [Appendix D](#) as a guide.

1.1.3 NASA KSC CM policy and requirements are provided and controlled by the responsible NASA organization and shall be flowed down to and specified in contracts or documented agreements [CM-05].

1.1.4 The supplier shall implement the CM requirements and activities (Configuration Identification, Configuration Control, Configuration Status Accounting, and Configuration Verification and Audit), with the responsible NASA organization conducting insight and oversight in accordance with contracts or documented agreements [CM-06]. CM details for the programs and projects are commonly described in their respective CM documentation.

1.1.5 Interfaces that affect multiple organizations are handled using interface control documents/drawings and other applicable agreements. Interfaces that affect multiple organizations shall only be modified using a NASA directorate-approved configuration and change control process with a change directive from a chartered Configuration Control Board (CCB) [CM-07].

1.1.6 The [Operations, Maintenance, Engineering, and User \(OMEU\)](#) tool is part of the Center's CM Data Systems. The [OMEU](#) tool is a web-based tool providing the ability to research FSEU at KSC and systems managed/utilized by KSC at other locations. Configuration-related data in OMEU is derived from the Configuration Management Data Systems (CMDS) and includes an end item critical/configured designation, Program Model Number, and reference to applicable Baseline Numbers for each FSEU. OMEU also provides links to applicable top-level drawings and other reference documents such as Memorandums of Understanding (MOU) which define interfaces and Configuration Identification Documents which define in detail inclusions and exclusions from configuration control for applicable FSEU. Those and other interfaces are defined in documentation such as contractual documents (e.g., interface control documents), and MOUs.

1.1.6.1 The OMEU tool identifies four types of responsibilities related to CIs indicating which organization is responsible for Operations (O), Maintenance (M), Engineering (E), and User (U) of that CI. It is important to ensure that O, M, E and U values are correct for each CI. NASA organizations are responsible to ensure that the O, M, E, and U data within the CMDS tool are correct for their respective support contracts. NASA and contractor organizations at KSC shall:

- a. Utilize the OMEU tool or CMDS to identify O, M, E, and U responsibilities [CM-08].
- b. Update the O, M, E, and U via the CMDS as part of their processes for turnover and acceptance of systems [CM-09].
- c. Audit, annually, the O, M, E, and U data for active systems for their organization to ensure the data is correct and provide a statement of completion to the KSC CM Project Manager [CM-10].
- d. Ensure that they have the E (engineering) responsibility for the CIs being modified, prior to sustaining engineering activities ([see Appendix A](#)) [CM-11].
- e. Ensure that when configured systems are modified (including through excessing or other means of disposal) that there is an approved CCB directive and that CM metadata is updated to indicate that the hardware has changed or is no longer part of an active system [CM-12]. The purpose of this requirement is to ensure that configuration documentation and CM metadata accurately reflects systems in use at KSC.

1.1.7 CM organizations shall ensure closed-loop processes which accommodate change, facilitate the reuse of standards and best practices, ensure that all requirements remain clear, concise, and valid, communicate promptly and precisely and ensure conformance in each case [CM-13].

1.2 Program and Project Requirements

NASA KSC organizations that implement a program (or program elements) or project(s) shall establish and document that suppliers have established and documented processes and procedures that define their CM system and requirements in accordance with this KNPR and all applicable program and project level requirements ([see Table P.1](#)) [CM-14].

1.3 Institutional Requirements

KSC institutional organizations shall establish or ensure that suppliers have established and documented processes and procedures that implement the requirements of [NPR 7150.2](#), [NPR 7120.5](#), [NPD 8710.5](#), [NPR 8715.3](#), [NASA-STD-8719.7](#), [KNPR 8830.1](#), and [EIA 649-2](#) [CM-15].

1.4 Roles and Responsibilities for Verification and Validation

The KSC CM Project Manager has the responsibility for assessment and audit of organizational and contractor compliance with their internal CM plans and processes as well as compliance with Center-level CM policy, processes, and plans. The KSC CM Project Manager shall approve KSC organizational CM plans [CM-16].

1.4.1 The KSC CM Project Manager shall approve tailoring and variances of requirements of this KNPR as captured specifically in organizational CM plans through the KSC CM Project Manager's approval of the CM plans (see [KNPR 1410.2](#), [KSC Directives Management Procedural Requirements](#), Section 3.2.1) [CM-17].

1.4.2 The KSC CM Project Manager shall participate in Functional Configuration Audits (FCAs), Physical Configuration Audits (PCAs), and compliance audits [CM-18].

CHAPTER 2. CONFIGURATION MANAGEMENT REQUIREMENTS

NASA and contractor organizations shall document how CM is to be implemented via a CMP (template available in EIA-649-2, which is available through [TechStreet](#) or the [KSC Library](#)) or other documentation (e.g., Program Plan) that, at a minimum, address the requirements of CM Planning, Configuration Identification (CIId) (including identification of Computer Software CIs, where applicable), Configuration Control, Configuration Status Accounting, and Configuration Verification and Audit as described in this document [CM-19].

2.1 Configuration Management Planning

2.1.1 CM planning and management over the life cycle of a product are essential to achieve effective, predictable, and repeatable CM processes. The CM task is best integrated throughout an organization so that CM becomes part of the culture of the enterprise even in the event that an organization does not own hardware or software they have the responsibility to configuration manage their processes and documentation. Computer-aided tools and methodologies are part of the planning processes. KSC organizations shall:

- a. Designate CM entity or other designated authority responsible for implementing this KNPR (see [KTI-8040.1 CM POCs](#)) [CM-20]
- b. Baseline and release a CM plan and/or process documenting their CM and CTDM practices and CM organization responsibilities related to the following [CM-21]:
 - (1) The organization's technical processes, products, and services.
 - (2) How the organization ensures consistency between their products and product configuration information.
 - (3) How the organization's CM and CTDM practices support customer and stakeholder CM and CTDM.
- c. Ensure organizational CM plans shall address software CM, including CM of firmware and code for embedded controllers [CM-22].
- d. Provide a representative to support the [KSC Configuration Management Working Group, C-0110](#) [CM-23].
- e. Decompose (as required) and allocate the CM requirements of this KNPR to supplier contracts, along with identifying corresponding data deliverables satisfying each requirement or group of requirements as follows:
 - (1) These allocated CM requirements shall be tailored to ensure the contractor applies an appropriate level of CM related to the products and services they provide and that appropriate CM and technical data is provided to the Government [CM-25].
 - (2) CM requirements appropriate to the product being acquired shall be passed down to lower level suppliers, typically via purchase order or other subcontract agreement instrument. Tailoring requirements for subcontractors and suppliers is a major CM planning activity [CM-26].

(3) Subcontractors and suppliers shall be monitored via data reviews, Configuration Change Management (CCM), design reviews, product test results, configuration audits, and CM surveillance reviews, as appropriate [CM-27].

2.1.2 KSC organizations shall establish and maintain all configurations of the products throughout the product life cycle, including concept, implementation, operations-maintenance, sustainment, and disposal [CM-28]. The planning and implementation activities should minimally include the following:

- a. Define and establish organization(s) (program/project/Center/supplier/etc.),
- b. Roles and responsibilities (including internal and external interactions),
- c. Representatives (stakeholders),
- d. Training requirements/plans,
- e. Conflict resolution authorities, and
- f. A strategy to conduct CM for the system products and designated work products to include:

(1) Documenting how the project CMP, if any, will be implemented and maintained/controlled.

(2) Providing the appropriate reference configuration (baseline) at the start of each product-line life-cycle phase.

(3) Obtaining appropriate tools for CM.

(4) Training appropriate technical team members and other technical support and management personnel in the established CM strategy and any CM processes, procedures and tools.

(5) Ensuring the CM strategy complies with all existing requirements.

2.2 Configuration Identification

2.2.1 The CId function addresses the composition of configuration information, how each document, product, and unit or group of units of a product is uniquely identified; how relationships are maintained in product structures, how elements of the configuration are verified and released, and how product configuration is baselined for change management.

a. The CId function results in:

(1) Organized composition of the product and associated information.

(2) Defined, documented, and baselined product configurations and any follow-on approved configuration changes.

(3) Unique identification of products and product configuration information.

- (4) Consistency between a product and the information about the product.
- (5) Verified and released product configuration information.
- b. CId shall, at a minimum, address the following [CM-29]:
 - (1) Select and identify CIs (both hardware and computer software CIs as applicable) and specification of the minimal metadata and documentation required for each CI.
 - (2) Select configuration data/documentation to define configuration baselines for each CI.
 - (3) Define and document CI interfaces.
 - (4) Define the level of detail (function and physical characteristics) necessary for describing the CIs and their interfaces.
 - (5) Assign a unique identification for each CI, their parts and assemblies, documents, interfaces, deviations, waivers, and changes.
 - (6) Enter each item of configuration documentation and computer software source code into a controlled developmental configuration.
 - (7) Establish configuration baselines (functional, allocated, and product) for CIs as formally agreed upon points in the product development cycle.
 - (8) Provide documentation describing disposition of released drawings and documentation.

2.2.2 The purpose of CId is to incrementally establish and maintain a definitive basis for control and status accounting of CIs throughout their lifecycle.

2.3 Configuration Change Management

CCM is the process of controlling changes to a CI after its baseline documents have been formally established. CCM begins with the establishment of initial configuration baseline and continues through the program and/or project life cycle.

2.3.1 The CCM function includes managing both changes to and variances from the approved product configuration information for a product using a systematic, measurable process and applies to all types of products and all program phases. A CCB may be used at KSC as a decision forum to execute CCM functions ([see Appendix D](#)). The CCM process includes:

- a. Identifying the need for a change or a variance.
- b. Defining the appropriate approval authority for changes or variances.
- c. Defining and documenting impacts of the proposed change or variance.
- d. Evaluating the proposed change or variance and coordinating it through the approval or disapproval decision.
- e. Incorporating the change in the product and its related product configuration information.

f. Verifying that the change has been incorporated and that the product is consistent with the product configuration information.

2.3.2 CM organizations shall ensure that there are CM plans and processes in place to document change initiations, assessments, approvals, and closed-loop verifications [CM-30]. CM plans must also describe how configuration change traceability is achieved (e.g. linking change driver, assessment, CCB approval and evidence of change verification such as test or inspection reports). To ensure the integrity of the configuration, it is essential that CIs and their documentation be protected from unauthorized or unintentional change. CCM must address the following:

- a. Means of controlling changes.
- b. Process for evaluating effects of changes.
- c. Method for disposition of Change Requests (CR).
- d. Procedures for implementing and verifying approved changes to documentation and CIs.

2.3.3 The purpose of CCM is to ensure the flow of proposed changes, identification and documentation of the complete impacts, and the approval and release of only the approved changes to CIs and their related data/documents.

2.4 Configuration Status Accounting

Configuration Status Accounting (CSA) is the formalized recording and reporting of the established configuration information, hardware and software, the status of proposed changes, and the status of the implementation of approved changes. Metrics derived from CSA support the evaluation of the effectiveness of engineering and CM processes and insight into potential process improvements.

2.4.1 CSA should begin as soon as configuration data is generated. The originating organization's CM organization shall minimally engage upon initial baseline establishment [CM-31].

CSA programs must document the following:

- a. All CIs and their status.
- b. Proposed configuration changes and their implementation status.
- c. Variances (deviations and waivers) and their disposition rationale.
- d. Configuration verifications and their findings and dispositions.
- e. Traceability of all changes from initial baseline through current configuration.

2.4.2 CSA is intended to assure accurate identification of each CI and each delivered end item unit to enhance program and functional organizations and management's capability to identify, produce, inspect, deliver, operate, maintain, repair, refurbish, etc. for each CI and end item unit in a timely, efficient, and economical manner in satisfying their assigned responsibilities.

2.5 Configuration Verification and Audit

2.5.1 Configuration verification is the CM function and/or activity that ascertains that a product has achieved consistency and accuracy of the product requirements and product configuration information. Configuration verification is accomplished through technical reviews and audits of configured systems and CIs verifying that the configuration of the systems and CIs are in compliance with applicable data/documentation in accordance with CM plan and procedures.

There are two types of configuration audits as follows:

a. FCA: The FCA is the formal examination of the "as-tested" functional characteristics of a CI. The audit verifies that the item has achieved the requirements specified in its functional baseline documentation, and to identify and record any discrepancies. FCA's are conducted on both hardware and software CIs to assure that the technical baseline accurately reflects the functional characteristics of each CI.

b. PCA: The PCA is the formal examination of the "as-built" configuration of a CI (hardware and software) against its technical baseline. The PCA includes a detailed audit of engineering drawings, specifications, and technical data (including Commercial Off The Shelf [COTS] documentation).

(1) The PCA for a CI must not be started unless the FCA has already been accomplished. In the event that FCA and PCA are part of a combined event, the FCA portion must be completed first.

(2) After successful completion of the audit and the establishment of a Product Base Line, all subsequent changes are processed by formal engineering change action.

2.5.3 Configuration verification describes the audit process and the types of audits to be performed (physical vs. functional) and provides an audit schedule for verifying CIs.

2.5.4 CM organizations shall ensure that audit teams are created to perform FCA/PCAs, when FCA/PCAs are required [CM-32].

a. Audit teams will consist of personnel assigned to the project team to include:

- (1) SA personnel
- (2) Systems Engineer
- (3) Software Engineer
- (4) Logistics Support Personnel
- (5) Equipment Specialist
- (6) In-Service Engineer, etc., as required.

b. Systems Engineers (or other designated personnel) will serve as the lead for hardware and software FCA and software PCA.

2.5.5 CM organizations will ensure that required FCA/PCAs are conducted and include stakeholders such as system engineers and operations. FCA/PCAs will be combined where possible with other activities to minimize cost and operational impacts.

2.5.6 The supplier shall be responsible for supporting Government-conducted configuration audits in accordance with the following requirements except as amended by a contract, statement of work or documented agreement [CM-33]:

- a. The supplier shall be responsible for ensuring that subcontractors and vendors participate in Government configuration audits, as appropriate [CM-34].
- b. The supplier shall ensure that the configuration audits are conducted at the Supplier's facility or at a designated subcontractor facility, if approved by the Government [CM-35].
- c. The supplier shall be required to provide the necessary resources and material to perform the audit effectively [CM-36].

CHAPTER 3. INTERFACES BETWEEN PROGRAMS, PROJECTS, AND INSTITUTIONAL ORGANIZATIONS AND INFORMATION

3.1 New Programs and Projects: Product Configuration Information

3.1.1 KSC organizations, programs and projects using Digital Engineering (including Computer Aided Design (CAD)/Engineering Model-Based Systems Engineering, requirements management and system performance modeling/analysis) shall perform Product Data Life cycle Management (PDLM) through the use of systems and tools such as the KSC Design Data Management System in order to facilitate CTDM interoperability and sustainability [CM-37].

3.1.2 Each organization/CM organization supporting new projects/programs utilizing new or modified systems (products) shall plan and execute CTDM processes and products compliant with the current Agency and external best practices (e.g. SAE-EIA-649, MIL-STD-31000, etc.) for their product's definition and operational information maintaining the current as-operated and sustained baselines [CM-38]. This provides the ability to exchange product information relative to product design requirements, history, business relationships, transactions, and product supportability information across a backbone which is open and accessible to all who require it.

3.1.3 Each project/program/organization is responsible for preparing their plans, policies, and procedures to define the application and use of new and legacy/heritage facilities, systems, equipment, and related information. Legacy systems and equipment shall be brought into KSC's institutional PDLM system in accordance with agreements made with funding and implementing organizations [CM-39].

3.2 System Transition and Turnover

3.2.1 Transition is the process of the preparation and execution of the change of O, M, E, and U responsibility for FSEU between development and operations. The term "turnover" is used when referring to the completion of the transition.

3.2.2 KSC organizations and contractors shall define a process for transitioning/turning over systems at KSC [CM-40]. Transition/turnover process should include:

- a. Updating O, M, E, and U responsible organization and other CM metadata fields as needed to reflect the turnover in the CM Data System.
- b. Ensuring provisions to make original electronic authoritative source files available to the receiving organization.
- c. Ensuring identification of all manuals, drawings (construction drawings, modification drawings, Engineering Orders, and other), documentation, forms, test results, CI metadata, open problem reports, constraints, waivers and deviations, hazard analyses, logistics analyses and other data pertaining to the system or systems being turned over.

3.3 Definition of Project Scope

Systems that are part of the KSC ground systems and infrastructure must have Operations and Maintenance Documentation (OMD) in order to establish configuration baselines and reduce risk to Spaceport operations.

3.3.1 Programs and/or projects modifying one or more configured systems shall include production of OMD for each configured system being modified in the project scope [CM-41].

3.3.2 Programs and/or projects modifying configured systems to be turned over to another organization or contract shall include completion of turnover in the project scope [CM-42].

3.3.3 Programs and/or projects issuing new external contracts for engineering services (e.g., use of an Architecture and Engineering firm)

a. Programs and/or projects shall ensure contracts for engineering services require all drawing files are delivered to the Government in native digital engineering formats (e.g., CAD) and that the Government is not prevented from modifying the product (e.g. by passwords or other means) [CM-43].

b. Programs and/or projects shall ensure the native drawing files are released into the appropriate KSC repository (e.g., TechDoc or a PDLM system) [CM-44].

3.3.4 Programs and/or projects modifying KSC ground systems and infrastructure shall ensure CM organization participation in defining project scope to ensure proper identification of affected CIs (e.g. Baseline Numbers, Program Model Numbers, drawings and documentation) and planning for required OMD updates [CM-45]. The purpose is to help ensure project planning includes required OMD.

APPENDIX A. DEFINITIONS

Baseline, Configuration: A fixed reference configuration established by defining and recording the approved configuration data/documentation for a System or CI at a milestone event or at a specified time. Configuration baselines typically represent; 1) snapshots which capture the configuration or partial configuration of a CI at specific points in time; 2) commitment points representing approval of a CI at a particular milestones in its development, 3) control points that serve to focus management attention, and; 4) it serves as a documented basis for tracking incremental change to a configuration.

Baseline, Functional: The approved configuration documentation describing a system's or top level CIs performance (functional, inter-operability, and interface characteristics) and the verification required to demonstrate the achievement of those specified characteristics.

Baseline, Allocated: The current approved performance oriented documentation, for a CI to be developed, which describes the functional and interface characteristics that are allocated from those of the higher level CI and the verification required to demonstrate achievement of those specified characteristics.

Baseline, Product: The product baseline is the approved technical documentation that describes the configuration of a CI during the production, fielding/deployment and operational support phases of its life cycle. The product baseline prescribes; 1) all necessary form, fit, and function characteristics of a CI; 2) the selected functional characteristics designated for production acceptance testing, and; 3) the production acceptance test requirements.

Change Management: The process ensuring changes to and variances from a configuration baseline are properly identified, recorded, evaluated, approved or disapproved, and incorporated and verified whereby only authorized systematic modifications are allowed to product content and the resulting documentation becomes part of the product configuration.

Closed-loop Change Management: The CI being tracked can be traced from its original state to the final verified state, establishing a new baseline.

Component Facilities: Complexes that are geographically separated from the NASA KSC Center or institution to which it is assigned that are considered to fall under Space Flight projects.

Configuration: The functional or physical attributes of an existing or planned product (hardware, software and/or data), or a combination of products; or one of a series of sequentially created variations of a product.

Configuration and Technical Data Management (CTDM): CTDM requires the identification, definition, preparation, marking, control, distribution, archiving, and disposition of data. Data Management (DM) provides effective processes and tools to acquire and provide stewardship for data. When data is managed effectively, Life Cycle Costs (LCC) are reduced because data is only acquired to meet specific requirements at specific times.

- DM requires that retention of data be considered in accordance with Public Law and NASA records retention requirements (see [NPR 1441.1](#)). The principle of data retention or record preservation is to retain records commensurate with their value.

- Data development includes several phases. Initially, there are the planning and negotiation for data. Second, data exists in the draft phase that includes preparation, control, and disposition (approval/disapproval). Approved data becomes official requirements or guidelines by which the Program/Project/Center is expected to operate. When data is no longer needed, it becomes an official record; and, based on retention criteria, is eventually archived.

Configuration Control: The systematic proposal, justification, evaluation, coordination, approval (or disapproval) of proposed changes or requested variances and the implementation of all approved changes or variances in the configuration of a CI after establishment of the configuration baseline(s) for the CI.

Configuration Item: A CI is product, or major component in the product structure of a complex product (hardware, software, or combination of both) that satisfies an end use function and is designated for separate CM. CIs are typically referred to by an alphanumeric identifier which also serves as the unchanging base for the assignment of serial numbers to uniquely identify individual units of the CI.

Configuration Management: A management discipline applied over the product's life cycle to provide visibility and to control performance and functional and physical characteristics. CM is essentially the process of managing products, systems, equipment, facilities, and processes along with their definition data by managing their requirements, including all changes, and assuring that results conform in each case during its life cycle. A widely used handbook for CM guidance is [MIL-HDBK-61, Military Handbook Configuration Management Guidance](#).

Configuration Management Organization: The office, organization or individual responsible for planning and executing the CM function for a NASA organization or contractor; or the collaborative CM effort shared between and at the Program/Project/Center and the Supplier.

Configuration Management Program: The KSC CM Program Manager ensures CM principles and requirements are properly implemented across KSC, ensuring system performance and data integrity.

Configuration Status Accounting: The CM function that formalizes the recording and reporting of the established product configuration information, the status of requested changes, and the implementation of approved changes including changes occurring to product units during operation and maintenance.

Contracting Requirements: All KSC initiated contracts must include the necessary and applicable institutional, organizational, program, and project Configuration and Data Management (CDM) clauses and Data Requirements Documents to support CDM for the deliverable product's entire lifecycle.

Data: Data is information (e.g., concepts, thoughts, opinions, findings, etc.) that has been recorded in a form that is convenient to move or process. For the purposes of this procedural document, commercial and government enterprises concern themselves with three broad types or categories of data. Table A.1 lists data types, indicates how each is typically used, and provides some examples.

Table A.1 Data Types

Type	Usage	Examples
Product	Collaboration	Engineering drawings and models, parts catalogs, software applications and their components, operational and maintenance instructions, and training materials Scientific data such as written notes and observation of phenomena Cost, schedule, and performance data
Business	Collaboration	Plans and schedules, financial information, inventory status, and human resource information
Operational	Transactional records exchange	Orders, issues, receipts, bills of lading, and invoices

Data Exchange and Interoperability: Every attempt to enable the exchange and transfer of data amongst the multiple tools and systems used for CM should be built around NASA, government, and/or industry standards such as the Government Electronics & Information Technology Association's (GEIA) EIA-836 Configuration Management Data Exchange and Interoperability, GEIA-859 Data Management, and International Organization of Standardization 10303 Industrial Automation Systems and Integration - Product Data Representation and Exchange standards. CDM systems, tools, and processes will be able to support the Government-Industry Data Exchange Program (GIDEP). GIDEP is the cooperative information-sharing program between the United States and Canadian governments and industry participants. The goal of GIDEP is to ensure that only reliable and conforming parts are in use on all Government programs and operations. GIDEP members share technical information essential to the research, design, development, production, and operational phases of the life cycle of systems, facilities, and equipment.

Data Management: The management discipline, in the context of this procedural document, which consists of the disciplined processes and systems that plan for, select, generate, prepare, acquire, protect and use , and provide stewardship for technical, product and product-related business data, consistent with requirements, throughout the product and data life cycles. Thus, this document primarily addresses product data and the business data intrinsic to collaboration during product design, development, test-evaluation, build, acquisition, and sustainment. It is recognized, however, that the principles articulated in this standard also have broader application to business data and operational data in general. It is also intended that the data addressed by this procedural requirements document is subject to data administration, metadata management, records management, and other processes applied at the KSC enterprise level, and that these principles must be applied in that enterprise context.

Developmental Configuration: The design and associated technical data/documentation that defines the organization's evolving design solution during development of a CI. The developmental configuration for a CI consists of the CM organization's internally released technical documentation for hardware and software design that is under the developing Center Management Operation's configuration control prior to delivery to the customer as a formal baseline/deliverable.

Heritage System: Often refers to methods and technologies which were inherited from one's organizational or project/program predecessors.

Insight: A process that uses performance requirements and performance metrics to ensure capability, quality and effectiveness.

Legacy System: An existing method, technology, computer system, or application program that continues to be used, typically because it still functions for the users' needs, despite newer technology or more efficient methods that might exist. A legacy system may include procedures or terminology which are no longer relevant in the current context, and may hinder or confuse understanding of the newer methods and technologies that are currently being used.

Metadata: Properties of or information about CM data used to identify, characterize or build associations between data items (title, document number, model identifier, creation date, etc.). In the current KSC CM tools, CM metadata includes Program Model Number, Baseline Number, values of O, M, E and U as well as other data items.

Operations and Maintenance Documentation (OMD): Documentation required to operate and maintain a system. OMD may include drawings, digital engineering models, instructions, specifications, risk or hazard analyses logistics/spares analyses, maintenance instructions and other information.

Operations, Maintenance, Engineering and User (OMEU) (tool): Legacy web-based interface to search the CMDS database with links to TechDoc.

- **Operations**: Responsibility indicating that the designated organization will perform routine operation of the hardware or software in the field, online (or in-situ) repair or replacement of parts of flight and ground hardware and validation testing of hardware and software. Operations responsibilities also include execution of procedures related to non-maintenance activities (e.g. processing, checkout and integration of flight and ground hardware; execution of training activities or simulations).
- **Maintenance**: The systematic day-to-day and periodic work required to preserve software or equipment in a condition so that it can be effectively utilized for its designated purpose and to prevent malfunction or failure. Maintenance encompasses (but is not limited to) scheduled inspection, cleaning, testing, adjustment, calibration, lubrication and replacement of parts. Maintenance also encompasses those activities required to restore functionality of hardware or software to its original specification or performing routine upgrades in order to maintain functionality or ensure maintainability.
- **Engineering**: Engineering responsibility is defined as design, development and offline testing activities required to design, fabricate, assemble and integrate hardware or software items. Engineering responsibilities include hardware or software design changes (including major upgrades). Engineering also includes activities related to production of engineering drawings, specifications, manuals and related documentation for performance of Sustaining Engineering functions. This activity may also include simulations and tests performed in the field for Verification and Validation of functionality and requirements.
- **User**: User responsibility indicates that the designated organization has accountability for the property or facility in question. The user is the Government or contractor organization that is accountable for the item (facility, subsystem, equipment, etc.) in question.

Oversight: An intrusive process where Supplier data is gathered through on-site, in-line involvement in the process.

Performance-Based Contracting: Structuring all aspects of an acquisition around the purpose of the work to be performed with the contract requirements set forth in clear, specific, and objective terms with measurable outcomes as opposed to either the manner by which the work is to be performed or broad and imprecise statements of work.

Product Configuration Information: The technical information that identifies and defines the items functional, performance and physical characteristics.

Product Definition Data: Includes the design and analysis data (CAD/Computer Aided Engineering models, drawings, parts & notes lists (bill of materials and bill of information) analyses, reports, etc. associated with the product data type) and all supporting information describing the engineering product. This information can include part and document information represented in a Product Data Management system with data, documentation, objects and attributes.

Program: A strategic investment by a Mission Directorate or Mission Support Office that has a defined architecture and/or technical approach, requirements, funding level, and a management structure that initiates and directs one or more projects. A program defines a strategic direction that the Agency has identified as critical ([NPD 7120.4](#)).

Project: A specific investment having defined goals, objectives, requirements, LCC, a beginning, and an end. A project yields new or revised products or services that directly address NASA's strategic needs. They may be performed wholly in-house; by Government, industry, academia partnerships; or through contracts with private industry ([NPD 7120.4](#)).

Real Property: Land and rights in land, buildings and other structures, utility distribution systems, and ground improvements and appurtenances thereto, permanently annexed to land.

Space Flight Program/Projects: Programs and projects that provide flight and ground systems technologies and operations for space and aeronautics. Projects, tasks, facilities, and systems, which do not interface directly with flight and ground systems for space and aeronautics operations or technologies are not considered Space Flight projects. For example, the KSC Central Campus Headquarters Building (M7-0301) and the Operations Support Building (K6-1096) (institutional buildings) are not considered Space Flight assets while the Launch Control Center (K6-0900) and the Space Station Processing Facility (M7-0360) are Space Flight assets.

Supplier: An organization that provides products or services to another organization (the Customer). Suppliers may be Government, KSC contractors, Spaceport partners, academia or external to KSC. Supplier organizations may provide facilities, systems, equipment, data or other products to Customer organizations either by physical or electronic delivery or through an interface (e.g. power or other commodities). The Supplier may be the design agency involved in production of a product, or be limited to producing documentation. Note: The role of "contractor" is not defined in this document and is assumed to be included within the role of "Supplier".

Sustaining Engineering: Technical tasks (engineering and logistics investigations and analyses) to ensure continued operation and maintenance of a system with managed (i.e., known) risk. This involves the identification, review, assessment, and resolution of deficiencies throughout a system's life cycle. It is also implementation of selected corrective actions, to include configuration or maintenance processes, and the monitoring of key sustainment health metrics such as the following:

- Collection and triage of all service use and maintenance data.
- Analysis of safety hazards, failure causes and effects, reliability and maintainability trends, and operational usage profiles changes.
- Root cause analysis of in-service problems (including operational hazards, deficiency reports, parts obsolescence, corrosion effects, and reliability degradation).
- The development of required design changes to resolve operational issues.
- Other activities necessary to ensure cost-effective support to achieve readiness and performance requirements over a system's life cycle.

Transition: Transition is the process of the preparation and execution of the change of O, M, E and U responsibility for FSEU between development and operations

Turnover: The process of one KSC organization or contractor providing a system to another organization and the receiving organization accepting the system. During the turnover process any applicable O, M, E and U metadata are updated to show any changes in responsibility.

Variance: A departure from approved product definition information, for a limited amount of time or for a specified effectivity, that does not require revision of approved product definition information (see [EIA-649](#)). A variance may be caused by design errors, manufacturing planning errors, supplier part slippages, production faults, material recalls and by various other reasons. Variances are implemented through deviations or waivers.

- A Request for Variance is required when a departure from approved product definition information is needed for a specific number of units of the product or for a specific period of time. It differs from a request for change as it does not require change to the configuration definition information it departs from because, upon approval, it is an authorized exception to the configuration information.
- The Request for Variance (deviation or waiver) must be documented, coordinated, evaluated, and dispositioned by the appropriate approval authority.

APPENDIX B. ACRONYMS

CC	Configuration (Change) Control
CAD	Computer Aided Design
CCB	Configuration Control Board
CCM	Configuration Change Management
CDM	Configuration and Data Management
CI	Configuration Item
CId	Configuration Identification
CM	Configuration Management
CMDS	Configuration Management Data Systems
CMP	Configuration Management Plan
COTS	Commercial Off The Shelf
CR	Change Request
CSA	Configuration Status Accounting
CTDM	Configuration Technical Data Management
DM	Data Management
FCA	Functional Configuration Audit
FSEU	Facilities, Systems, Equipment and Utilities
GEIA	Government Electronics & Information Technology Association
GIDEP	Government-Industry Data Exchange Program
GS	Ground Support
KNPR	Kennedy NASA Procedural Requirements
KSC	Kennedy Space Center
LCC	Life Cycle Cost
MOU	Memoranda of Understanding
NASA	National Aeronautics and Space Administration
NPD	NASA Procedural Directives
NPR	NASA Procedural Requirements
OMD	Operations and Maintenance Documentation
OMEU	Operations, Maintenance, Engineering, and User
PCA	Physical Configuration Audit
PDLM	Product Data Lifecycle Management
SA	Safety and Mission Assurance

APPENDIX C. REFERENCE DOCUMENTS

- C.1. [NPR 1600.1, NASA Security Program Procedural Requirements](#)
- C.2. [NPR 2200.2, Requirements for Documentation, Approval and Dissemination of NASA Scientific and Technical Information](#)
- C.3. [NPD 2810.1, Security of Information Technology](#)
- C.4. [KNPR 8830.1, Facilities Asset Management Procedural Requirements](#)
- C.5. AS9100, Quality Systems – Aerospace - Model for Quality Assurance in Design, Development, Production, Installation and Servicing
- C.6. IEEE STD 828, IEEE Standard for Software Configuration Management Plans
ANSI/GEIA 859, Data Management
- C.7. GEIA-HB-859, Implementation Guide for Data Management
- C.8. ANSI/GEIA-859-2004, GEIA Standard for Data Management
- C.9. ANSI/ASME Y14.100, Engineering Drawing Practices
- C.10. [NASA-HDBK-1004, NASA Digital Engineering Acquisition Framework Handbook](#)
- C.11. [NASA Systems Engineering Handbook, Section 6.5, Configuration Management](#)
- C.12. [NASA Systems Engineering Handbook, Section 6.6, Technical Data Management](#)
- C.13. [LX24-UG-14 Operations, Maintenance, Equipment, and User \(OMEU\) User Guide](#)

APPENDIX D. CONFIGURATION CHANGE MANAGEMENT AND CONFIGURATION CONTROL BOARD

D.1 This appendix provides guidance on CCM and CCBs to KSC organizations and contractors' roles and responsibilities, processes, products, and outcomes.

D.2 CM Project using External Contracts

This appendix is primarily focused around the Change Management in the context of projects internal to KSC. This section pertains to the use of external contracts. Change Management is extremely important in projects using an external contract. CM personnel should be involved in helping plan for the contract. During the planning phase CM personnel:

- a. Assist in identification of CIs to be delivered or modified by the contract and ensuring the contract contains requirements for proper marking of CIs.
- b. Define CM requirements to be allocated to the contractor.
- c. Data Integrity: Develop and oversee document and data version control, marking (including titles, SBU and other marking), storage, distribution, change management, and data protection. These CM functions ensure the integrity of both the contract-related data (e.g. Statement of Work) and products delivered by the contractor.
- d. CM functions during project reviews: Ensuring the correct version of the correct products are delivered to reviewers and that review comments are close-loop tracked
- e. Ensure that project decisions are documented and verification that the decision has been implemented
- f. Ensuring the contract contains appropriate language related to data (to ensure the project gets the correct data at the time it is required in the right formats and that the contract ensures the Government has the rights to all required data)

D.3 CCM Roles in KSC Change Management

CCBs are a common means to ensure that technical decisions are appropriately documented, reviewed, coordinated and that technical decisions are made by a person authorized and accountable for the decisions. Further detail on CCBs follows:

- a. CCBs ensure technical decisions are implemented and appropriate CM practices have been followed.
- b. CCBs may be referred to by various names, depending on the program or organization, including Change Management Board, Project Control Board, or as a Program Review Board.
- c. CCB activities are triggered by a request for change. These requests for change may be called by differing names, including CR, Engineering Change Proposal, Field Engineering Change (FEC), or Engineering Work Request (EWR).

These will generically be referred to as CRs, which are generated by customers or stakeholders as a result of a problem report, Material Review Board action, approved project or other driver. The CR is submitted to the CCB in accordance with the established process ([see Figure 3](#)). The CCB primary objectives ensure the following:

- a. Technical decisions are made by someone with the authority to make the decision.
- b. Ensure that the scope of the change includes all affected systems ([see D. 4, Change Evaluation](#)).
- c. Ensure thorough evaluation of technical, cost, schedule and risk impacts of the proposed change.
- d. Decisions are coordinated and communicated to customers and stakeholders.
- e. Approved changes are reviewed and implemented in an orderly and traceable manner, ensuring that appropriate Configuration Management is maintained.
- f. CCBs for programs and organizations are governed by an organization-specific charter, which describes the board's authority and member roles and responsibilities. CCBs typically have a Chair, Secretariat, and representatives from stakeholder organizations. CCBs have processes describing how the initiation, coordination, evaluation, and disposition and tracking of changes is accomplished.
- g. Configuration Management plays a key role in CCB activities. CM roles in CCB activities ensure the following:
 - (1) CRs are linked to the change driver.
 - (2) CRs identify the affected systems and related configuration metadata.
 - (3) Decisions are properly documented (e.g. CCB Directive or equivalent) and are closed only after verifying implementation.
 - (4) CCB actions are documented and tracked.
 - (5) CCB minutes are captured and released (communication of decisions).
 - (6) Evidence of change incorporation is linked to CCB directives.
 - (7) Documentation has been released and project closeout has occurred.

D.4 Change Evaluation

Change evaluation activities ensure that CCB decisions are based on complete and accurate information about all impacts of the change. Change evaluations may be referred to as an Engineering Assessment and Cost Estimate or other name. Change evaluation activities include:

- a. Develop proposed implementation(s) and an assessment of the following:
 - (1) Cost estimates to include administration, engineering, development, prototyping, planning, manufacturing, testing, increased/decreased life cycle costs for new parts, scrapping or rework of parts on hand, new or revised tooling, new or revised software, recall and retrofit of already purchased or delivered units, increased/decreased effort and resources required to fulfill service requirements for customers. Cost considerations also include engineering documentation, operations, maintenance, commodity/utility cost/availability, software maintenance and licensing, information technology, and physical security.
 - (2) An assessment of impacts to both safety and operational risk as well as risk to Spaceport partners
 - (3) An assessment of schedule impacts to programs, projects and Spaceport partners
 - (4) An overall assessment of the impact of the proposed change on supportability, interchangeability, interoperability and operational readiness
- b. Recommendation for selection of the best option
- c. Assessment of the impact of deferring change implementation (if applicable)
- d. Change evaluations are presented to the CCB. The CCB chair may decide to approve, defer or disapprove the proposed change. Deferred changes should be tracked and a process or criteria specified for bringing deferred changes back to the CCB.

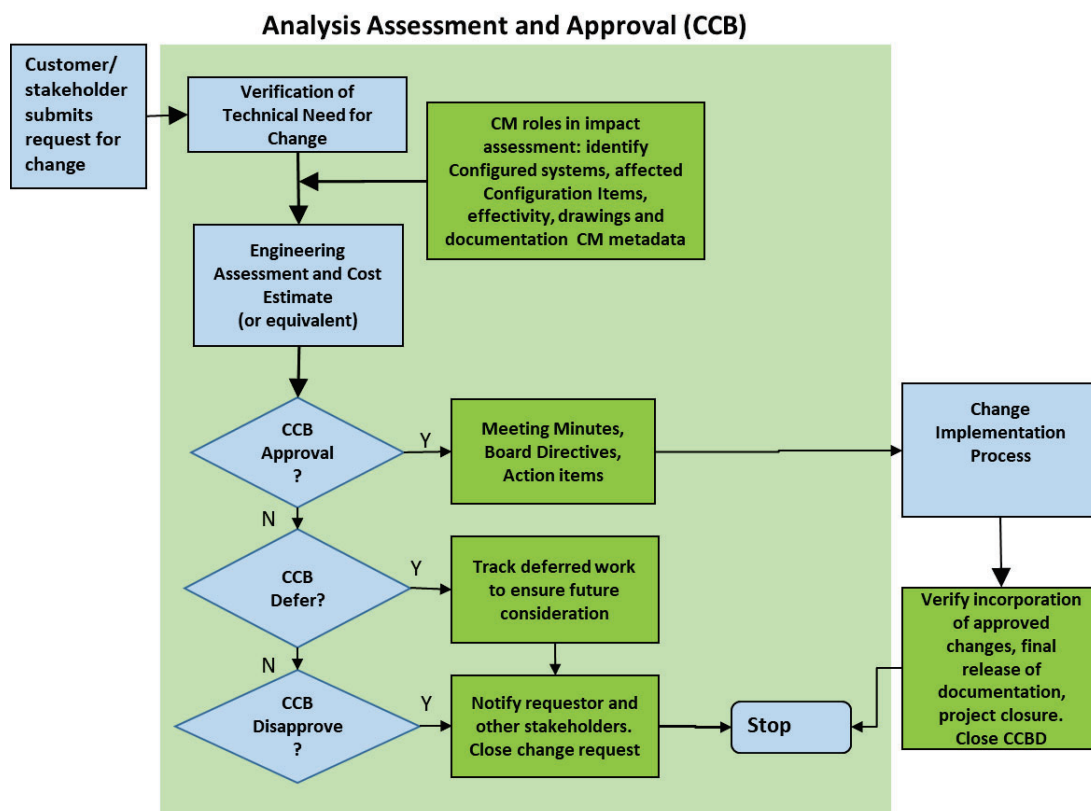


Figure 3 – Generic CCB Process

APPENDIX E. COMPLIANCE MATRIX FOR PROGRAMS/PROJECTS/ORGANIZATIONS

Template Instructions

The Compliance Matrix documents the program/projects/organizations compliance or intent to comply with the requirements of this KNPR or justification for tailoring. It is attached to the CMP or other equivalent program/project/organization documentation when submitted for approval. The matrix lists:

- The unique requirement identifier
- The paragraph reference
- The KNPR 8040.1 requirement statement
- The rationale for the requirement
- A "Comply?" column to describe applicability or intent to tailor
- The "Justification" column to justify how tailoring is to be applied

The "Comply?" column is filled in to identify the program/projects approach to the requirement. An "FC" is inserted for "fully compliant," "T" for "tailored," or "NA" for a requirement that is "not applicable." The column titled "Justification" documents the rationale for tailoring, documents how the requirement will be tailored, or justifies why the requirement is not applicable.

Req Number	KNPR Section	Requirement Statement	Rationale	Comply ?	Justification
CM-01	P.2 c.	All organizations shall ensure and verify that the necessary level or degree of Configuration Management (CM) is being applied in order to define, control changes, and ensure each Configuration Item's (CIs) physical and/or functional configuration is correct, and is commensurate with applicable institutional, program, project, organizational CM and Safety and Mission Assurance (SA) requirements	To ensure all organizations account for CM whether or not they have a standalone CM function and that CM is appropriately tailored to the product		
CM-02	P.2 d.	NASA programs/projects/ Centers shall be responsible for developing and managing CM requirements (see Chapter 2)	High level requirements that set the standards for each Center /program /project /organization specifies its CM requirements		
CM-03	1.1.1	KSC supplier organizations and support contractors shall have CM plans and/or processes documenting their CM and CTDM practices and responsibilities related to the services and products they provide to customers, how they ensure consistency between the product and product configuration information, as well as how their CM and CTDM practices support customer CM and CTDM	Requirement ensures that when organizations are suppliers that they plan and document how their CM works from a supplier perspective and how their CM integrates with their customer's CM		
CM-04	1.1.2	KSC Space Flight projects and programs shall implement their CM programs in accordance with Table P.1 , as well as any other contractual requirements	Table P.,1 provides guidance on the applicable standards		
CM-05	1.1.3	NASA and KSC CM policy and requirements are provided and controlled by the responsible NASA organization and shall be flowed down to and specified in contracts or documented agreements	Ensures that CM requirements are specifically allocated to contracts and other governing agreements		

Req Number	KNPR Section	Requirement Statement	Rationale	Comply ?	Justification
CM-06	1.1.4	The Supplier shall implement the CM requirements and activities (identification, control, accounting, and verification and audit), with the responsible NASA organization conducting insight and oversight into the performance-based activity in accordance with contracts or documented agreements	Supplier CM plans providing for the necessary insight/oversight		
CM-07	1.1.5	Interfaces that affect multiple organizations shall only be modified using a NASA directorate-approved configuration and change control process with a change directive from a chartered Configuration Control Board (CCB)	Ensures that when the decision is made to modify a system/interface that may impact multiple organizations, the decision is vetted with stakeholders and made by a designated authority.		
CM-08	1.1.6 a.	NASA and contractor organizations at KSC shall utilize the OMEU tool or CMDS to identify O, M, E and U responsibilities	Ensures that O, M, E and U information is identified using KSC's official system rather than via nonofficial tracking methods (e.g. spreadsheets)		
CM-09	1.1.6 b.	NASA and contractor organizations at KSC shall update the O,M,E,U via the CM Data System as part of their processes for turnover and acceptance of systems	Ensures that turnover/transition processes include updating O, M, E and U data fields in official KSC CM systems		
CM-10	1.1.6 c.	NASA and contractor organizations at KSC shall Audit, annually, the O, M, E, and U data for active systems for their organization to ensure the data is correct and provide a statement of completion to the KSC CM Project Manager	Ensures that O, M, E and U data in KSC CM systems reflect up-to-date and accurate information		
CM-11	1.1.6 d.	NASA and contractor organizations shall ensure that they have the E responsibility for the CIs being modified prior to Sustaining Engineering activities (see Appendix A)	The "E" field in KSC CM system indicates the organization having Engineering authority over the system.		

Req Number	KNPR Section	Requirement Statement	Rationale	Comply ?	Justification
CM-12	1.1.6 e.	NASA and contractor CM organizations shall ensure that when configured systems are modified (including through excessing or other means of disposal) that there is an approved CCB directive and that CM metadata is updated to indicate that the hardware has changed or is no longer part of an active system	The purpose of this requirement is to ensure that configuration documentation and CM metadata accurately reflects systems in use at KSC		
CM-13	1.1.7	CM Programs shall ensure closed-loop processes which accommodate change, facilitate the reuse of standards and best practices, ensure that all requirements remain clear, concise and valid, communicate promptly and precisely and ensure conformance in each case	Requirement reflects the benefits of good CM.		
CM-14	1.2	NASA KSC organizations that implement a program (or program elements) or project(s) shall establish and document that Suppliers have established and documented processes and procedures that define their CM system and requirements per this KNPR and all applicable program and project level requirements (see Table P.1).	Requirement ensures that the "customer" organization is verifying that suppliers have documented CM plans/processes		
CM-15	1.3	KSC institutional organizations shall establish and document that Suppliers have established and documented processes and procedures that implement the requirements of NPR 7150.2 , NPR 7120.5 , NPD 8710.5 , NPR 8715.3 , NASA-STD-8719.7 , KNPR 8830.1 , and EIA 649-2	Requires KSC institutional orgs to ensure suppliers have CM.		
CM-16	1.4	The KSC CM Program shall approve KSC organizational CM plans	Allows the KSC CM Program manager to maintain consistency of CM operations across KSC		

Req Number	KNPR Section	Requirement Statement	Rationale	Comply ?	Justification
CM-17	1.4.1	The KSC CM Program shall approve tailoring and variances of requirements of this KNPR as captured specifically in organizational CM plans per KNPR 1410.2, KSC Directives Management Procedural Requirements	Provides a method to implement the requirements of KNPR 1410.2 related to tailoring. Allows the KSC CM Program manager the insight to which requirements are being fulfilled		
CM-18	1.4.2	The KSC CM Program shall participate in Functional configuration audits (FCAs), Physical configuration audits (PCAs) and compliance audits	Allows the KSC CM program to maintain cognizance of and monitor the thoroughness of FCA and PCA activity		
CM-19	Chp 2	NASA and contractor organizations shall document how CM is to be implemented via a CMP (template available in EIA-649-2, which is available through Techstreet or the KSC Library) or other documentation (e.g., Program Plan) that, at a minimum, address the requirements of CM Planning, Configuration Identification (CId) (including identification of Computer Software CIs, where applicable), Configuration Control, Configuration Status Accounting, and Configuration Verification and Audit as described in this document	CM planning and management over the life cycle of a product are essential to achieve effective, predictable, and repeatable CM processes		
CM-20	2.1.1 a.	KSC organizations shall Designate CM entity or other designated authority responsible for implementing this KNPR (see KTI-8040.1 CM POCs)	This is meant to ensure that there is a single person or group addressing truth, trust and traceability of documentation and work products		

Req Number	KNPR Section	Requirement Statement	Rationale	Comply ?	Justification
CM-21	2.1.1 b.	KSC organizations shall baseline and release a CM plan and/or process documenting their CM and CTDM practices and CM organization responsibilities related to the following (1) The organization's technical processes, products, and services. (2) How the organization ensures consistency between their products and product configuration information. (3) How the organization's CM and CTDM practices support customer and stakeholder CM and CTDM	In order to function as a Spaceport, KSC organizations need to ensure their processes and documentation, products and services are configuration managed and that these configuration management efforts integrate well with those of other organizations		
CM-22	2.1.1 c.	KSC organizations shall ensure organizational CM plans address software CM, including CM of firmware and code for embedded controllers	Systems are increasingly complex, often including embedded controllers, firmware and software. Configuration Management of software -related items is important for IT security as well as proper system function		
CM-23	2.1.1 d.	KSC organizations shall provide a representative to support the KSC Configuration Management Working Group, C-0110	The CM working group serves as a forum for disseminating information as well as addressing CM issues, which often are crosscutting and multidisciplinary		
CM-24	2.1.1 e.	KSC organizations shall decompose (as required) and allocate the CM requirements of this KNPR to supplier contracts, along with identifying corresponding data deliverables satisfying each requirement or group of requirements as follows	This requirement ensures that organizations specifically consider CM when they develop contracts to ensure that their contractors provide required products and information		

Req Number	KNPR Section	Requirement Statement	Rationale	Comply ?	Justification
CM-25	2.1.1 e.1	These allocated CM requirements shall be tailored to ensure the contractor applies an appropriate level of CM related to the products and services they provide and that appropriate CM and technical data is provided to the Government	Tailoring of CM requirements is intended to ensure that the Government receives what is needed without paying for CM products and services that are not required		
CM-26	2.1.1 e.2	CM requirements appropriate to the product being acquired shall be passed down to lower level suppliers, typically via purchase order or other subcontract agreement instrument. Tailoring requirements for subcontractors and suppliers is a major CM planning activity	In situations where there is a complex acquisition with multiple tears of suppliers appropriate CM requirements should be passed down to the necessary level supplier.		
CM-27	2.1.1 e.3	Subcontractors and suppliers shall be monitored via data reviews, Configuration Change Management (CCM), design reviews, product test results, configuration audits, and CM surveillance reviews, as appropriate	Organizations need an appropriate level of design reviews and supplier monitoring to ensure the integrity of the products being received		
CM-28	2.1.2	KSC organizations shall establish and maintain all configurations of the products throughout the product life cycle, including concept, implementation, operations-maintenance, sustainment, and disposal	During design reviews, it is important that the review team is evaluating the correct and current design. A Configuration Baseline needs to be established for the operational product as a point of stability for which changes can be tracked		

Req Number	KNPR Section	Requirement Statement	Rationale	Comply ?	Justification
CM-29	2.2.1 b.	CId shall, at a minimum, address the following: (1) Select and identify CIs (both hardware and computer software CIs as applicable) and specification of the minimal metadata and documentation required for each CI. (2) Select configuration data/documentation to define configuration baselines for each CI. (3) Define and document CI interfaces. (4) Define the level of detail (function and physical characteristics) necessary for describing the CIs and their interfaces. (5) Assign a unique identification for each CI, their parts and assemblies, documents, interfaces, deviations, waivers, and changes. 6) Enter each item of configuration documentation and computer software source code into a controlled developmental configuration. (7) Establish configuration baselines (functional, allocated, and product) for CIs as formally agreed upon points in the product development cycle. (8) Provide documentation describing disposition of released drawings and documentation	This requirement is meant to ensure that the organization consistently and correctly identifies configuration items (across its entire portfolio of projects and services) while providing the necessary documentation and data to define those configuration items; establishes configuration baselines and releases applicable configuration documentation into an official repository		
CM-30	2.3.2	CM organizations shall ensure that there is a CM plans and processes shall document change initiations, assessments, approvals, and closed-loop verifications	It is essential that CIs and their documentation be protected from unauthorized or unintentional change		

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CM-31	2.4.1	The originating organization's CM organization shall minimally engage upon initial baseline establishment. CSA programs must document the following: a. All CIs and their status. b. Proposed configuration changes and their implementation status. c. Variances (deviations and waivers) and their disposition rationale. d. Configuration verifications and their findings and dispositions. e. Traceability of all changes from initial baseline through current configuration.	To start tracking the CIs that are part of the configuration baseline		
CM-32	2.5.4	CM organizations shall ensure that audit teams are created to perform FCA/PCAs when FCA/PCAs are required.	Purpose of this requirement is to ensure that CM is aware of and involved in FCA/PCA		
CM-33	2.5.6	The supplier shall be responsible for supporting Government-conducted configuration audits in accordance with the following requirements except as amended by a contract, statement of work or documented agreement	CM organizations will ensure that required FCA/PCAs are conducted and include stakeholders such as system engineers and operations. Contracts need to be written such that suppliers support configuration audits		
CM-34	2.5.6 a.	The supplier shall be responsible for ensuring that subcontractors and vendors participate in Government configuration audits, as appropriate	This requirement ensures that sub-supplier and vendor contracts require them to support audits as needed		

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CM-35	2.5.6 b.	The supplier shall ensure that the configuration audits are conducted at the Supplier's facility or at a designated subcontractor facility, if approved by the Government	CM organizations will ensure that required FCA/PCAs are conducted and include stakeholders such as system engineers and operations. FCA/PCAs will be combined were possible with other activities to minimize cost and operational impacts. In cases where major construction/manufacturing has occurred off-site it is appropriate conduct audits at that location		
CM-36	2.5.6 c.	The supplier shall be required to provide the necessary resources and material to perform the audit effectively	To ensure that suppliers are required to provide everything necessary to enable successful audits		
CM-37	3.1.1	KSC organizations, programs and projects using Digital Engineering (including Computer Aided Design/Engineering Model-Based Systems Engineering, requirements management and system performance modeling/analysis) shall perform Product Data Lifecycle Management (PDLM) through the use of systems and tools such as the KSC Design Data Management System in order to facilitate CTDM interoperability and sustainability	Provides the ability to exchange product information relative to product design requirements, history, business relationships, transactions, and product supportability information across a backbone which is open and accessible to all who require it. This also is the fundamental requirement to perform PDLM		

Reqt Number	KNPR Section	Requirement Statement	Rationale	Comply ?	Justification
CM-38	3.1.2	Each organization/CM organization supporting new projects/programs utilizing new or modified systems (products) shall plan and execute CTDM processes and products compliant with the current agency and external best practices (e.g. SAE-EIA-649, MIL-STD-31000, etc.) for their product's definition and operational information maintaining the current as-operated and sustained baselines	This requirement is aimed at ensuring that the program/projects implement the latest requirements and best practices for configuration management		
CM-39	3.1.3	Legacy systems and equipment shall be brought into KSC's institutional PDL system in accordance with agreements made with funding and implementing organizations	This requirement is intended to enable institutional systems to be brought into an institutional product data lifecycle management system as money is obtained to do so		
CM-40	3.2.2	KSC organizations and contractors shall define a process for turning over systems at KSC	This requirement defines the need for an organized and documented processes for turning over ground systems and infrastructure		
CM-41	3.3.1	Programs and/or projects modifying one or more configured systems shall include production of OMD for each configured system being modified in the project scope	This requirement is intended to ensure that project scope includes production of Operations & Maintenance Documentation and that, when needed, additional funding from a different source is obtained produce OMD		

Req Number	KNPR Section	Requirement Statement	Rationale	Comply ?	Justification
CM-42	3.3.2	Programs and/or projects modifying configured systems to be turned over to another organization or contract shall include completion of turnover in the project scope	This requirement is aimed at ensuring that project scope turnover of an operational capability rather than scope being limited to just building something		
CM-43	3.3.3 a.	Programs and/or projects shall ensure contracts for engineering services require all drawing files are delivered to the Government in native digital engineering formats (e.g., CAD) and that the Government is not prevented from modifying the product (e.g. by passwords or other means)	To ensure that the native drawings are delivered and available for use and modification if necessary. This requirement is aimed at preventing the government from accepting paper drawings or other formats that are of limited use and may result in increased cost to the Government		
CM-44	3.3.3 b.	Programs and/or projects shall ensure the native drawing files are released into the appropriate KSC repository (e.g., TechDoc or a PDLN system)	This requirement is intended to eliminate practice of signing paper drawings and releasing signed paper rather than native files		
CM-45	3.3.4	Programs and/or projects modifying KSC ground systems and infrastructure shall ensure CM organization participation in defining project scope to ensure proper identification of affected CIs (e.g. Baseline Numbers, Program Model Numbers, drawings and documentation) and planning for required OMD updates	This requirement is intended to ensure proper identification of configuration items being modified and assist the project in planning for the production of all required OMD		