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|----------------------------------------|-----------------|---------------|
| <b>SYSTEMS MANAGEMENT<br/>STANDARD</b> | <b>EIA-649™</b> | <b>REV. C</b> |
|                                        | Issued          | 1998-05       |
|                                        | Revised         | 2019-02       |
| Superseding EIA-649B                   |                 |               |
| (R) Configuration Management Standard  |                 |               |

## RATIONALE

This standard was revised to clarify principles, content and to remove opinions in order to improve the quality and adoptability by all enterprises, whether commercial or government, regardless of industry.

## FOREWORD

This standard is intended to be used when establishing, performing, evaluating or improving Configuration Management (CM) processes.

When appropriately and effectively applied, CM provides a positive impact on every aspect of the product life cycle. CM is a comprehensive process for establishing and maintaining consistency of any product's performance, functional and physical attributes with its requirements, design, and operational information.

The essence of CM, as portrayed in this standard, is the common-sense application of CM functions and their underlying fundamental principles, which have universal applicability across the broad spectrum of commercial and governmental enterprises. Collectively, the functions and principles in this document are meant to be used like a compass; they provide the reliable direction required to stay on course and aid in sound decision making moving forward.

This standard provides the rational basis upon which to apply good judgment in both planning for and executing CM. An understanding of not just what to do, but why it is necessary to tailor the application of CM functions.

This standard treats CM principles as statements of fact which relate to implementing actions. The implementing actions for each CM function are defined in CM planning guided by the type of product involved and the environments in which it is to be developed, produced, marketed, distributed, used, and maintained. Because of the broad scope of its applicability, this standard is not written as a requirements document, per se, but as the foundation document upon which requirements may be structured.

Since terminology varies considerably in different application environments, this standard provides neutral terminology for each defined term so that a user can determine appropriate substitutes for specific context, clarity, and understanding. Regardless of the term used, the same principles apply.

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The functions and principles found in [Section 5](#) of this standard are “normative<sup>1</sup>” the remainder of this standard is informative.<sup>2</sup>

This revision replaces all previous revisions of this standard in whole.

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<sup>1</sup> Normative elements contain provisions with which it is necessary to conform (as described in the text above) in order to be able to claim conformance with the standard.

<sup>2</sup> Informative elements provide useful supportive information.

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## 1. INTRODUCTION

Configuration Management (CM) is a technical and management process applying appropriate processes, resources, and controls, to establish and maintain consistency between product configuration information, and the product (see [Figures 1 and 4](#)).

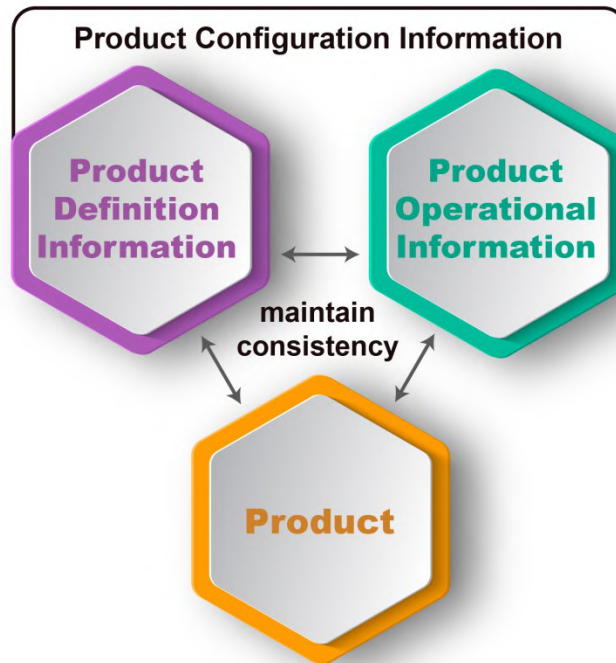


**Figure 1 - The product configuration being managed**

CM facilitates orderly identification of product attributes and:

- Provides control (i.e., traceability and management) of the product and its configuration information.
- Manages product changes that sustain and/or improve: capabilities, performance, resiliency, reliability, and maintainability; correct deficiencies; facilitate interface control; and extend product life.
- Manages departures from product requirements.

The term “product” in this standard should be interpreted as applicable to all product categories; e.g., documents, facilities, firmware, hardware, software, tools, materials, processes, services, systems. A disciplined CM process ensures that the product configuration information and changes to that information are identified, approved, verified, and recorded in sufficient detail to produce and support the product throughout its life cycle; and that the product conforms to the specified requirements. The CM processes result in accurate configuration information to facilitate product interchangeability and consistent reproducibility, and thus contributes to continuous safe and effective product development, production, operations, sustainment, and retirement.

Artifacts such as contracts, purchase orders, schedules, plans, costing and technical data are subject to CM where appropriate CM functions are applied to manage the information.

CM execution requires a balanced and consistent implementation of CM functions guided by CM principles throughout the product’s life cycle. Experience has demonstrated that the investment in resources necessary to perform effective CM is returned in long-term cost avoidance and risk mitigation. Significant expenses (e.g., to re-establish the accuracy of product configuration information) are avoided when CM is applied continuously throughout the product’s life cycle.

Benefits of appropriate CM include:

- Establishment and sustainment of an authoritative source of information

- Collaboration across capability roles, functions, and systems
- Improving efficiencies
- Improving information flow
- Improving process effectiveness
- Eliminating waste
- Improving product control
- A leaner, more reliable and resilient enterprise

Continuous CM application provides authentic approved source information for items such as:

- Administering warranties
- Determining liabilities
- Managing proposed changes
- Performing maintenance and overhaul
- Identifying and resolving safety, security and environmental issues

| Revision | Description of Change                                                                                                                                                                                                                                            | Release Date |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Interim  | Interim EIA standard EIA/IS-649 initiated to replace MIL-STD-973 by a task to develop an industry configuration management standard by ANSI project PN-3414.                                                                                                     | Aug 1995     |
| —        | ANSI/EIA-649 initiated by ANSI project PN-3721 to submit the industry configuration management standard for approval by ANSI ballot.                                                                                                                             | May 1998     |
| A        | ANSI/EIA-649 initiated by a task to separate the normative principles from the informative material and expand the use of neutral terminology in the industry configuration management standard by ANSI project PN-4766 and approved by ANSI Ballot.             | Oct 2004     |
| B        | Revision B was initiated to enhance the standard and to harmonize with other TechAmerica standards. Revision B is considered an entire rewrite of the standard so change bar indicators in the margins are not utilized.                                         | Jun 2011     |
| C        | Revision C was initiated as part of a Five-Year review. It includes clarification to principles and content, as well as the removal of opinions, in order to improve the quality and adoptability, by all enterprises, of the standard as an actionable product. |              |

## 2. SCOPE

This standard defines five CM functions and their underlying principles. The functions are detailed in [Section 5](#). The principles, highlighted in text boxes, are designed to individually identify the essence of the related CM function and can be used to collectively create a checklist of “best practice” criteria to evaluate a CM program.

The CM principles defined in this standard apply equally to internally focused enterprise information, processes, and supporting systems (i.e., Enterprise CM - policy driven, supporting the internal goals needed to achieve an efficient, effective and lean enterprise), as well as to the working relationships supported by the enterprise (i.e., Acquirer/Supplier CM - contracted relationship to support external trusted interaction with suppliers).

In an Enterprise CM context there are several methodologies for principle use by the enterprise:

- The principles of this standard provide direction for developing enterprise or functional CM plans focused on identifying, defining, authorizing, and managing CM activities.
- These plans identify the participants involved in activities, their responsibilities, their authority, and how accountability is administered to serve enterprise/activity objectives.
- The Enterprise uses CM's integrity-based traceability and management capabilities as a foundation to support the “best practice” initiatives of data/information management, quality assurance, program/project management, systems engineering and life cycle logistics, by providing principle-guided functions to achieve a more efficient, effective and lean enterprise.

In the Acquirer/Supplier CM context there are several methodologies for conformance by a supplier:

- Acquirer requires a CM plan consistent with the principles of this standard from the supplier.
- Acquirer uses this standard to develop a checklist with which to evaluate supplier CM plans.
- Acquirer reviews and approves the supplier CM plan and makes it a requirement of the contract. This method requires both parties to the acquisition to understand both the concepts and the tailoring.
- Acquirer uses the principles of this standard as the basis for developing either or both an enterprise CM requirements document or a specific project CM requirements document to impose on suppliers. The requirements documents may state this standard's principles as requirements and reference this standard's paragraphs. Compliance with the contractual requirements constitutes conformance with this standard.

In describing each CM function and its principles, this standard utilizes neutral Configuration Management terminology, while also providing equivalent terms, that have historically been used in various product environments (see [Table 2](#)). There is no intent to express a preference for any particular set of terminology.

Similarly, this standard uses a neutral set of names for the phases of a product's life cycle, which are generic enough to be easily mapped to the myriad of different life cycle models in use. [Table 1](#) illustrates some of the aliases for each phase name and identifies characteristics that apply to each one.

Regardless of the titles chosen for these phases, or what the product is (i.e., a facility, software, an airplane or a machine screw), at some point in its history a product will go through all or most of these phases. The phases can have considerable overlap, or the sequence of the phases might change or be repeated, e.g., for product improvements and enhancements. Approved configurations of a product can be in the build, distribution, operation, and disposal phases simultaneously, and changes to those configurations may occur during all life cycle phases.

Appropriate application of CM functions enables a user of this standard to plan and implement a CM program for a product, project, or enterprise. All functions apply during every phase of the product's life cycle but the degree to which each of the CM principles applies may vary. A scalable CM process should be defined, measured, continuously improved, and adhered to, that is commensurate with the product's complexity, its intended use, and its value over the product life cycle.



**Figure 2 - The product life cycle being managed**

**Table 1 - Phases of a product's life cycle**

| Phases >                        | Conception                                                                                                                                                             | Definition                                                                                                                                                                                                                     | Build                                                                                                                  | Distribution                                                                                                | Operation                                                                                                                             | Disposal                                                                                                                                                                                  |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aliases                         | Concept<br>Exploration<br>Marketing<br>Predevelopment<br>Research<br>Study<br>Material Solution<br>Analysis<br>Technology<br>Development                               | Design<br>Development<br>Engineering<br>Engineering &<br>Manufacturing<br>Development<br>Program Definition<br>Source Coding<br>Software Build                                                                                 | Construction<br>Fabrication<br>Manufacturing<br>Production<br>Software Build                                           | Delivery<br>Deployment<br>Fielding<br>Installation<br>Sales                                                 | Maintenance<br>On orbit<br>Operation &<br>Support<br>Operational<br>Performance<br>Repair<br>Service Life<br>Warranties<br>In-Service | Decommissioning<br>Disposition<br>Removal from<br>Service                                                                                                                                 |
| Characteristics<br>Of the Phase | Analysis<br>Functions<br>Investigation<br>Need<br>Opportunity<br>Mission<br>Pre-Concept &<br>Concept Definitions<br>Survey<br>Trade-Offs<br>Requirements<br>Definition | Architecture<br>Detailed Design<br>Evaluation<br>Manufacturing Planning<br>Preliminary Design<br>Prototyping<br>Software Code & Test<br>Specification<br>System Definition<br>Testing<br>Functional and Allocated<br>Baselines | Assembly<br>Facility<br>Construction<br>Installation<br>Inspection<br>Manufacture<br>Production<br>Product<br>Baseline | Acceptance<br>Commissioning<br>Deployment<br>Installation<br>Order<br>Setup<br>Stock<br>Supply<br>Transport | Depreciate<br>Maintain<br>Modernize<br>Modify<br>Operate<br>Recover<br>Sustainment<br>Upgrade<br>Use<br>Utilization                   | Archive<br>Deactivate<br>Destroy<br>Disassemble<br>Discard<br>Disposition<br>Environmental<br>Impact<br>Historical<br>Significance<br>Legacy<br>Mothball<br>Recycle<br>Retrieval<br>Scrap |

An organization that has the responsibility for performing Configuration Management for a product during any period of its life cycle could be a commercial enterprise, e.g., contractor, subcontractor, supplier, or government agency. References in this standard to the acquirer (i.e., customer) should be interpreted as the entity that specifies requirements (functional and performance attributes) for the product or that acquires and uses the product. An acquirer may be external to the developing and producing organization or may be internal such as marketing, management, or the using department.

Configuration Management functions related to a product may be the responsibility of several organizations during its life cycle. For example, an organization with the responsibility to design and build a product will perform Configuration Management during the definition and build phases; other organizations or government activities with responsibility for upgrading the product and servicing units will perform Configuration Management during the operation phase.

GEIA-HB-649 “Configuration Management Standard Implementation Guide,” provides additional “how to” guidance for planning, managing, and implementing CM functions and principles.

### 3. REFERENCES

This standard does not cite any references, within its text, that constitute provisions of this standard. References cited within the text and listed in Annex B are for information purposes only.

### 4. TERMINOLOGY

Because this standard has global application across diverse industries and governmental activities in which terminology differs, a neutral set of terms is used. The neutral terms translate to that which is common to any particular user environment through the concepts inherent in their definitions.

This section promotes standardization by aiding in understanding equivalency of terms by defining the terms used within this standard and other closely related terms.

#### 4.1 Definitions

For purposes of this standard, the definitions in [Table 2](#) apply. The terms in the first column of this table are the ones primarily used in this standard. They are neutral terms and are not unique to any industry or governmental practice. Related terms are also provided in column 3 of the table. There is no intent to express a preference for any particular terminology. When planning and documenting a CM program, an enterprise may substitute any other terms familiar to their environment for the terminology used within this standard. There is also no intent to rigidly adhere to the neutral terminology within this standard if, in specific instances, use of a related term provides clarity.

For additional definitions of other configuration management terms and configuration attributes, see the latest versions of GEIA-HB-649, EIA-649-1, EIA-649-2, and ANSI/EIA-836. These artifacts logically extend the CM principles of this standard, establish a common data exchange language for interoperability between enterprises, and provide the relationships between defined terms and their properties.

[Annex C](#) provides an alphabetical list of the related terms cross-referenced to the terms defined in [Table 2](#). Terms found in Webster’s dictionary which are commonly used in the English language are not defined in this standard.

**Table 2 - Terms, definitions, and related terms**

| Neutral Term Used in This Standard | 649 Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Related Terms                                                                                                                                                                                                          |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| acquirer                           | An individual or enterprise that (1) commissions the engineering or design of a product; (2) is a prospective purchaser of the end products of a system or a portion thereof; (3) is a procurer of a product; (4) is a user or consumer of the product; or (5) an obtainer of output.                                                                                                                                                                                                                                                               | customer, acquisition activity, authority, buyer, engineering user, external end user, internal user, management, marketing department, procuring activity, specification activity, prime contractor                   |
| approval authority                 | The organization or person authorized to approve: (1) A configuration change to a product, (2) Changes to product definition information and other related documents, (3) Release (or cancellation) of documents for use anywhere or in a specific program and (4) Commitment of resources.                                                                                                                                                                                                                                                         | change approval authority, configuration change management authority, change control board chairperson, decision authority, project manager, material review board                                                     |
| approved configuration             | The baseline plus any approved changes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                        |
| artifact                           | (1) A contained piece of information that is used or produced by a software or hardware development process, or by deployment and operation of a system. Examples of artifacts include: representational views, model files, source files, scripts, and binary executable files, a table in a database system, a development deliverable, a word-processing document, or a mail message. (2) Physical entities and their elements such as patterns, parts, components, and assemblies. New artifacts can be created by grouping existing artifacts. | document, software, physical items                                                                                                                                                                                     |
| baseline                           | See configuration baseline.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                        |
| change board                       | A group comprised of technical and administrative representatives who review and recommend approval or disapproval to the approval authority, of changes and variances to a configuration managed product and its supporting documentation.                                                                                                                                                                                                                                                                                                         | change control board, change review board, configuration control board; program review board                                                                                                                           |
| configuration                      | (1) The product attributes of an existing or planned product, or a combination of products, i.e., product requirements, the product, and associated product configuration information; (2) one of a series of sequentially created variations of a product.                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                        |
| configurability                    | The capability to temporarily adapt or rearrange the configuration of a system or system of systems to accommodate the needs of a particular application or deployment.                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                        |
| configuration audit                | Review of processes, product definition information, documented verification of compliance with requirements, and an inspection of products, to confirm that products have achieved their required attributes and conform to released product configuration definition information.                                                                                                                                                                                                                                                                 | functional configuration audit, physical configuration audit, product configuration verification, conformity inspection, configuration conformance check, product consistency verification, system verification review |
| configuration baseline             | Configuration of a product, at a specific point in time, which serves as a basis for defining change, for conducting verifications, and for other management activities. For a software product, the build baseline includes the actual product.                                                                                                                                                                                                                                                                                                    | Allocated Baseline, build baseline, developmental baseline, Functional Baseline, product baseline                                                                                                                      |
| configuration change               | A change to the product configuration information and the product.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | engineering change                                                                                                                                                                                                     |
| configuration change management    | The CM function that ensures changes to and variances from a configuration baseline are properly identified, recorded, evaluated, dispositioned, and incorporated and verified as appropriate.                                                                                                                                                                                                                                                                                                                                                      | change control, change management, enterprise change management                                                                                                                                                        |
| configuration control              | The systematic proposal, justification, evaluation, coordination, disposition of proposed changes or requested variances and the implementation of all approved changes or variances in the configuration after the establishment of a configuration baseline.                                                                                                                                                                                                                                                                                      | configuration governance, configuration change management                                                                                                                                                              |
| configuration identification       | The CM function which (1) assigns unique identifiers to each product and product configuration information; (2) establishes a structure for products and product configuration information; (3) selects, defines, documents, and baselines product attributes.                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                        |
| configuration item (CI)            | A product, allocated components of a product, or both, that satisfies an end use function, has distinct requirements, functionality and/or product relationships, and is designated for distinct control.                                                                                                                                                                                                                                                                                                                                           | Computer Software Configuration Item (CSCI), configuration object, configured product, designated item, product, functionally significant item                                                                         |

| Neutral Term Used in This Standard    | 649 Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Related Terms                                                                                                                         |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| configuration management (CM)         | A technical and management process applying appropriate processes, resources, and controls, to establish and maintain consistency between product configuration information, and the product.                                                                                                                                                                                                                                                                                   |                                                                                                                                       |
| configuration status accounting (CSA) | 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.                                                                                                                                                                                                    | configuration database, configuration records, status accounting                                                                      |
| configuration verification            | Verification of requirements and incorporation of approved configuration changes (see verification).                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                       |
| customization                         | The action to permanently establish a configuration of a system or system of systems with a unique set of items to satisfy a particular application or deployment with no intention of changing or rearranging the custom configuration over the life of the product.                                                                                                                                                                                                           |                                                                                                                                       |
| design activity                       | An organization that has, or has had, responsibility for the design of an item. (Adapted from ASME Y14.100)                                                                                                                                                                                                                                                                                                                                                                     | design authority                                                                                                                      |
| design release configuration          | The set of design information, incrementally released to date, by the development activity for a product during a product's definition (development) phase.                                                                                                                                                                                                                                                                                                                     | Design Release Baseline, developmental baseline, development configuration, developmental configuration baseline, release record      |
| disposition (noun)                    | Refer to Merriam-Webster dictionary.                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                       |
| disposition (verb)                    | To make a decision on a change to either approve, disapprove, defer or cancel.                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                       |
| document                              | Refer to Merriam-Webster dictionary.                                                                                                                                                                                                                                                                                                                                                                                                                                            | records, specifications, engineering drawings, drawing lists, reports, standards, models, metadata, attributes, database, source code |
| effectivity                           | A designation, defining the product range; e.g., serial numbers, block numbers, batch numbers, lot numbers, model, dates or event, at which a specific product configuration applies, a change is to be or has been affected, or to which a variance applies.                                                                                                                                                                                                                   | batch number, break-in point, block number, change applicability, incorporation date(s), lot number, serial number, series            |
| enterprise                            | A business or government organization or a discrete portion thereof.                                                                                                                                                                                                                                                                                                                                                                                                            | company, contractor, design authority (legacy), design activity, manufacturer, organization, supplier                                 |
| enterprise identifier                 | A string of characters that uniquely identifies the enterprise. This identifier is assigned by an issuing organization within a scheme and is unique to that scheme.                                                                                                                                                                                                                                                                                                            | CAGE Code, D-U-N-S number, ISO/SAE WMI code, Organization Identifier                                                                  |
| fit                                   | The ability of a product to interface or interconnect with, or become an integral part of, another product.                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                       |
| form                                  | The shape, size, dimensions, and other physically measurable parameters that characterize a product.                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                       |
| function                              | The action or actions that a product is designed to perform.                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                       |
| functional attributes                 | Measurable performance characteristics. These are expressed in terms of quantitative parameters; e.g., range, speed, lethality, reliability, maintainability, resiliency, safety, processing speed, random access memory, and operational and logistical parameters, including their respective tolerances where applicable.                                                                                                                                                    | attributes, characteristics, requirements                                                                                             |
| group identifier                      | An alphanumeric identifier that (1) uniquely identifies a group of like units (lot) of the same product which are manufactured or assembled under uniform conditions and are expected to function in a consistent manner. (2) uniquely designates a specific volumetric quantity (batch) of a material, usually a chemical mixture, created at the same time and expected to have properties similar to, but not necessarily identical to other batches created at other times. | batch number, block number, date, date code, lot number                                                                               |
| information                           | A combination of data and the application of rules, that is recorded, classified, organized, related, or interpreted within a certain context.                                                                                                                                                                                                                                                                                                                                  | organized data, facts, knowledge                                                                                                      |
| interface control                     | The process of identifying, recording, and managing product attributes' interface information at the common boundary of two or more products provided by one or more organizations.                                                                                                                                                                                                                                                                                             | interface management                                                                                                                  |

| Neutral Term Used in This Standard | 649 Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Related Terms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| interface information              | The documented and agreed-to functional and physical attributes (characteristics) required to exist at a common boundary between two or more products. The attributes can consist of software languages, software codes, wires, plugs, sockets, or computer system menus and services. They can also be expressed in terms of quantitative parameters; e.g., physical size, shape, material composition, and operating and logistical parameters, including their respective tolerances where applicable. | interface attributes, interface control document, interface control drawing, interface specification                                                                                                                                                                                                                                                                                                                                                                                           |
| major change                       | A change with significant impacts, such as impacts to functional and physical interchangeability and supportability of the product (see <a href="#">Table 4</a> ).                                                                                                                                                                                                                                                                                                                                        | class I change                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| metadata                           | Data about data, properties (title, document number, creation date, etc.) used to identify or define a data item.                                                                                                                                                                                                                                                                                                                                                                                         | data attributes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| minor change                       | A change that has little or no significant impact (see <a href="#">Table 4</a> ).                                                                                                                                                                                                                                                                                                                                                                                                                         | class II change                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| performance                        | A quantitative measure characterizing a physical or functional attribute relating to the execution of an operation or function; e.g., quantity (how many or how much), quality (how well), coverage (how much area, how far), timeliness (how responsive, how frequent), and readiness (availability, mission/operational readiness).                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| physical attributes                | Quantitative and qualitative characteristics of material, including interfaces; e.g., composition, dimensions, finishes, tolerances, source and object code, compilation information, complexity level, data structure, platform, drivers.                                                                                                                                                                                                                                                                | attribute(s), characteristics, requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| product                            | Anything used in or resulting from the execution of a process including the process itself.                                                                                                                                                                                                                                                                                                                                                                                                               | assembly, component, Computer Software Configuration Item (CSCI), Configuration Item (CI), end item, facility, hardware, item, material, part, service, set, software, system, unit, asset, artifact, commodity                                                                                                                                                                                                                                                                                |
| product configuration information  | Information about a product consisting of product definition information and product operational information.                                                                                                                                                                                                                                                                                                                                                                                             | configuration documentation, product information                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| product definition information     | Information that defines the product's requirements, documents the product attributes including the process information, and is the authoritative source for configuration management of the product.                                                                                                                                                                                                                                                                                                     | associated lists, configuration documentation, design basis, design documentation, design information, design output, engineering drawing, interface control document, interface document, model-based definition/product model, requirements document, software requirements specification, software design document, software product specification, specification, technical data, technical data package, Product Definition Data, Product Definition Element, Product Definition Data Set |
| product identifier                 | An identifier, unique to the issuing organization, used to designate products of the same configuration, and to differentiate them from other products.                                                                                                                                                                                                                                                                                                                                                   | dash number, document identifier, item name, model, name, nomenclature, part name, part number, title, version                                                                                                                                                                                                                                                                                                                                                                                 |
| product operational information    | Information developed from product definition information used to test, operate, maintain and dispose of a product.                                                                                                                                                                                                                                                                                                                                                                                       | operation instructions, operational information, maintenance instructions, technical manual, technical order                                                                                                                                                                                                                                                                                                                                                                                   |
| product structure                  | A hierarchical view of the composition, relationships, and quantities of a product and its components.                                                                                                                                                                                                                                                                                                                                                                                                    | Bill of Material (BOM), drawing list, drawing tree, hierarchy, indented drawing list, indented listing, indented parts list, product tree, pyramid, specification tree, top-down breakdown                                                                                                                                                                                                                                                                                                     |
| release (verb)                     | To authorize for dissemination, a particular version of product and/or product information that is made available for a specific purpose.                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| released (adj)                     | A status level indicating that a document and/or product under configuration change control has been reviewed and is authorized for use.                                                                                                                                                                                                                                                                                                                                                                  | approved, issued                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| request for change                 | The means by which a change is proposed, described, justified, and submitted to the approval authority.                                                                                                                                                                                                                                                                                                                                                                                                   | change proposal, change record, change request, contract change proposal, design change, engineering change memo, engineering change package, engineering change proposal, engineering change request, enterprise change request, proposed change, red line change package                                                                                                                                                                                                                     |
| request for variance               | The means by which a manufacturer or supplier requests permission to depart from the product definition information for (1) a specific unit, (2) a specific number of units, or (3) a specific period of time without requiring revision of the product definition information.                                                                                                                                                                                                                           | alteration request, concession, deviation, engineering departure, exception request, nonconformance, production departure, request for deviation, request for waiver, waiver                                                                                                                                                                                                                                                                                                                   |
| requirement                        | (1) Need or expectation that is stated and obligatory;<br>(2) Specified value for an essential product attribute.                                                                                                                                                                                                                                                                                                                                                                                         | specification shall statement                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Neutral Term Used in This Standard | 649 Definition                                                                                                                                                                                                                                                                                                      | Related Terms                                                                                                                        |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| retrofit                           | The incorporation of a new design or a product modification resulting from an approved configuration request for change, into product units already produced.                                                                                                                                                       | modification, revision, rework, update                                                                                               |
| revision                           | The result of updating a product or product configuration information (also see Version).                                                                                                                                                                                                                           | issue, update, version                                                                                                               |
| rework                             | A procedure applied to a nonconformance that will completely eliminate it and result in a product that conforms completely to the drawings, specifications, or contract requirements. The supplier must disclose that the rework occurred when outside the normal process to manufacture the part.                  |                                                                                                                                      |
| supplier                           | An enterprise that provides a product (end products, enabling products, or both) or a group of products to an acquirer. The supplier (external or internal to the acquirer's enterprise) can be a provider that has a product that does not need development, or a developer that must develop the desired product. | contractor, developer, designer, distributor, manufacturer, producer, provider, seller, subcontractor, vendor                        |
| supply chain                       | (1) Suppliers and sub suppliers. (2) The linked activities associated with providing material from a raw material stage to an end user as a finished product.                                                                                                                                                       |                                                                                                                                      |
| sustainment                        | (1) The provision of logistics and personnel services required to maintain and prolong operations of a product. (2) The portion of the product life cycle during which those services are provided.                                                                                                                 | logistics support                                                                                                                    |
| tailor                             | The manner in which configuration management principles, requirements, and processes are adapted for a particular purpose.                                                                                                                                                                                          | tailoring, tailored                                                                                                                  |
| unit                               | (1) The result of producing a tangible single instance of a product or (2) In software, the lowest separately compilable piece of code element within the software product structure, corresponding to a separately compilable piece of code.                                                                       | product instance                                                                                                                     |
| unit identifier                    | A sequentially-issued character string (alphanumeric identifier) used to designate a specific unit of a product.                                                                                                                                                                                                    | keel number, line number, manufacturing identifier, platform number, serial number, tail number, vehicle identification number (VIN) |
| validation                         | The confirmation that a product, service, or system meets the needs of the customer or other identified stakeholders.                                                                                                                                                                                               | audit                                                                                                                                |
| 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.                                                                                                                   | alteration, departure, deviation, engineering departure, non-conformance, production departure, waiver, concession                   |
| verification                       | Confirmation by test, analysis, demonstration, simulation, or inspection that a specified requirement has been fulfilled by the product.                                                                                                                                                                            | analysis, check, demonstration, inspection, proof, conformance, test, validation                                                     |
| version                            | A specific configuration of a product or document (see Revision).                                                                                                                                                                                                                                                   | configuration, issue, revision                                                                                                       |

## 4.2 Symbols and Abbreviations

The following symbols and abbreviations are used in this standard:

|         |                                                                                                |
|---------|------------------------------------------------------------------------------------------------|
| ANSI    | American National Standards Institute                                                          |
| ASME    | American Society of Mechanical Engineers                                                       |
| CAD     | Computer Aided Design                                                                          |
| CAGE    | Commercial and Government Entity                                                               |
| CCM     | Configuration Change Management                                                                |
| CI      | (Funct:) Configuration Identification; (Noun:) Configuration Item                              |
| CLIN    | Contract Line Item Number                                                                      |
| CM      | Configuration Management                                                                       |
| CMMI    | Capability Maturity Model Integration                                                          |
| CMP     | (Funct:) Configuration Management Planning & Management; (Noun:) Configuration Management Plan |
| CSA     | Configuration Status Accounting                                                                |
| CSCI    | Computer Software Configuration Item                                                           |
| CVA     | Configuration Verification and Audit                                                           |
| DM      | Data Management                                                                                |
| DMS     | Diminishing Manufacturing Sources                                                              |
| D-U-N-S | Data Universal Numbering System                                                                |
| EIA     | Electronic Industries Alliance                                                                 |
| FCA     | Functional Configuration Audit                                                                 |
| GEIA    | Government Electronics and Information                                                         |
| F3I     | Form, Fit, Function, and Interface                                                             |
| IEC     | International Electro-Technical Commission                                                     |
| IEEE    | Institute of Electrical and Electronics Engineers                                              |
| ISO     | International Organization for Standardization                                                 |
| PCA     | Physical Configuration Audit                                                                   |
| PDM     | Product Data Management                                                                        |
| PLM     | Product Lifecycle Management                                                                   |
| SCM     | Software Configuration Management                                                              |
| VIN     | Vehicle Identification Number                                                                  |

## 5. CM FUNCTIONS AND PRINCIPLES

**Principle CM-1. Configuration Management implementation requires a balanced and continuous application of CM functions and their underlying principles throughout the product life cycle.**

The CM process described in this standard provides a flexible and comprehensive methodology for enterprises to manage and control the product configuration. It consists of five interrelated functions which, when collectively applied, maintain consistency between product configuration information and the product throughout conception, development, production, delivery, and support. The CM functions, shown in [Figure 3](#) with their corresponding sections, are: [5.1](#), Configuration Management Planning and Management; [5.2](#), Configuration Identification; [5.3](#), Configuration Change Management; [5.4](#), Configuration Status Accounting; and [5.5](#), Configuration Verification and Audit.

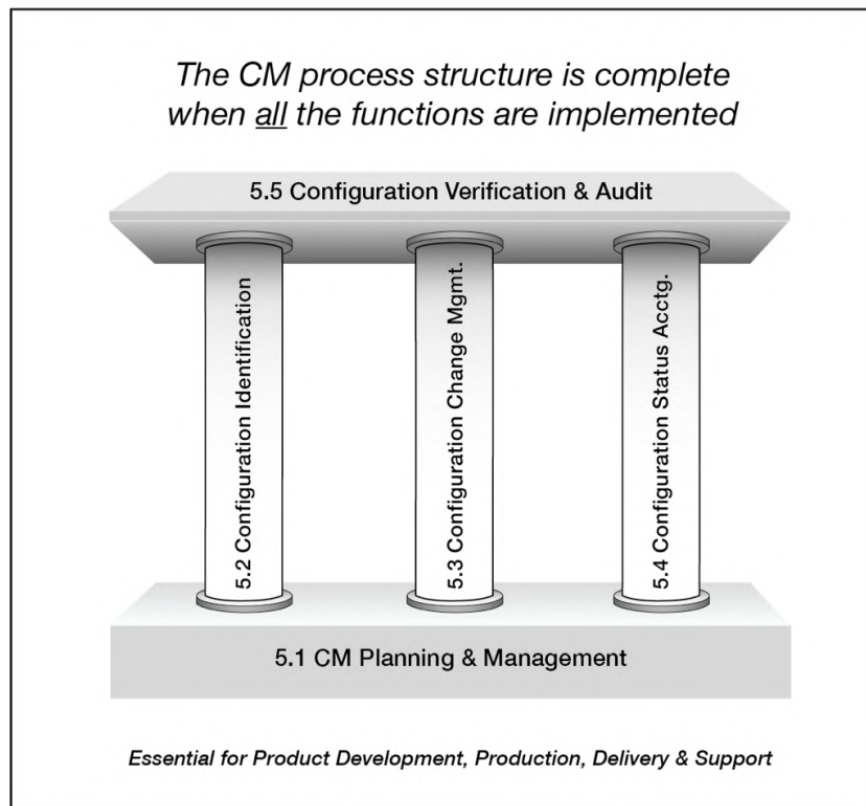


**Figure 3 - CM functions**

Configuration Management implementation requires a balanced and consistent application of the CM functions and their underlying principles. Although each function is described separately, its implementation is not performed in isolation. Maximum benefit from the CM process requires the five functions to work together seamlessly and continuously throughout the product life cycle.

To achieve consistency of a product's configuration and to ensure the ability to replicate it, functional and physical attributes are identified, documented, verified, and approved. The product configuration information becomes more detailed and definitive as the product is developed and matures. It is captured, retained, and maintained in a Configuration Status Accounting (CSA) system that provides the status of the product information and is used in generating baselines; providing the basis for managing changes; and for performing configuration management activities.

The consistency of product configuration information is maintained throughout the product's life cycle by identifying and evaluating the impact of all proposed changes through the configuration change management process and verifying that the product and all related product information have been updated.

Instructive information is provided to assist in CM implementation planning as follows:

- [Annex A](#) provides a tabulated summary of the CM principles.
- [Annex B](#) provides a list of other associated consensus standards.
- GEIA-HB-649 provides extensive guidance and illustrative examples.

## 5.1 Configuration Management Planning and Management

CM planning and management over the life cycle of a product are essential to achieving effective, predictable, and repeatable CM processes. CM processes shape the application of solid, practical procedures that result in cost avoidance and enhanced configuration quality and stability.

Comprehensive CM planning and management includes:

- Applying the appropriate level of CM functions throughout the product's life cycle.
- Implementing policies and procedures, resulting in effective configuration management.
- Assigning CM functional responsibilities to appropriate organizational elements.
- Training of CM personnel and any others who have CM responsibilities.
- Determining and applying adequate resources to implement the planned CM system.
- Establishing CM performance measures to serve as a basis for continuous improvement.
- Ensuring appropriate performance of Configuration Management by the supply chain through insight and oversight.
- Integrating the organization's product configuration information processes.

### 5.1.1 Identify Context and Environment

***Principle CMP-1. The foundation for CM planning, which delineates the specific CM application methods and their levels of emphasis, is an understanding of the context and environment of the product to which the CM process is to be applied.***

Identify the context and environment of the product so that CM Planning can be tailored to an appropriate level to meet the product requirements, complexity, and life cycle environment. Develop a clear understanding of the product and environment to which the CM functions and principles will be applied. This will ensure that the CM Plan and procedures will be appropriate to the product requirements, complexity, and the life cycle environment. Although all CM functions are necessary, many different factors influence the specific CM requirements, processes, tools, and the level of CM emphasis to be applied to a particular product. These factors may include:

- Product constraints, e.g., scope, importance, complexity, production quantity, quality requirements.
- Organizational constraints, e.g., number and size of organizations involved, budgets, schedules.
- The physical environment in which the product is to be used.
- Type of support to be provided; e.g., factory support, dealership support, independent maintenance center support, customer support, or no support required.

- Life cycle phase.
- Approval authority over the product configuration information.
- Contract requirements for the project, its products and, for configuration management.
- Access and control, i.e., Intellectual property rights and data distribution, Export Control, etc.
- Certification requirements.

Questions relating to the above factors that can be addressed include:

- What are the attributes of the customer's (including who is/are the customer[s]) and the end user's environments that need to be addressed by CM? (e.g., who will support and maintain the product: the customer, the supplier, the user, or another party?)
- What role will the customer play in decisions about changes?
- What is the current phase of the life cycle and what are the anticipated future phases?
- What is the technical complexity of the product?
- Are there product components that require separate management attention?
- Will it be necessary to conduct an FCA/PCA?
- What extent of configuration change management over supplier efforts will be necessary?
- Is the product, or its components, a new design, an existing design, or a modification to an existing design?
- How complex of a documentation package is necessary?
- If in the operational phase, what documentation is available, and does it reflect the current product?
- What level of change activity, if any, is anticipated?
- Are customers/users expected to request changes?
- What is the anticipated operational life of the product?
- What, if any, are the required attributes related to disposal; are environmental issues involved?
- What specific information will users, maintenance activities, or others require?

### 5.1.2 Document the Outcome of CM Planning

***Principle CMP-2. CM Planning documents how the organization will implement CM throughout the applicable phases of the product life cycle to provide consistency between the product configuration information and the product.***

CM Planning is a comprehensive approach that reflects efficient, appropriate application of configuration management principles and practices to the identified context and environment. The documented outcome, independent of format would normally include the following topics:

- General product definition and scope.
- Description of CM activities and procedures for each major CM function (Prin. CM-1).
- Organization, roles, responsibilities, and resources.
- Definitions of terms.
- Programmatic and organizational interfaces.
- Deliverables, milestones, and schedules.
- Subcontract flow down requirements.

The documented outcome of CM Planning should be assessed and updated periodically, as well as following any significant change affecting the context and environment (e.g., changes in suppliers, or supplier responsibilities, changes in diminishing manufacturing sources, part obsolescence, changes in resource availabilities, changes in customer contract, changes in the product and organizational changes). CM Planning should also be reviewed on a periodic basis to make sure that an organization's application of CM functions is current.

Unless required by the customer, the form and format of the CM planning documentation, whether included with other project planning or included in a stand-alone CM plan, is not critical. However, execution of Configuration Management per the planning documentation is essential to successfully maintain consistency between product configuration information and the product.

### 5.1.3 Apply Adequate CM Resources and Assign Responsibility

***Principle CMP-3. To implement planned CM functions, resources are identified and applied, and responsibilities to perform CM activities are assigned.***

To effectively and appropriately plan and implement Configuration Management in all phases of the product life cycle, it is essential to include adequate resources. Required resources may include but are not limited to: facilities, personnel, information systems, and equipment or tools. The resources may be distributed throughout an enterprise and its supply chain.

Factors such as the complexity of the project, the interfaces required with customers and suppliers, and other aspects of the project, all influence the roles and resources required to implement the CM functions. Each project, program, or organization must assess the varying level of CM resources required to support the product in each phase of the life cycle. CM resource planning addresses CM roles and associated responsibilities, authority and accountability, skills and level of effort required.

#### 5.1.4 Establishment of Performance and Status Measurements

***Principle CMP-4. The establishment and maintenance of CM performance and status measurements are necessary for all products where compliance with the Configuration Management planning and continuous improvement is critical.***

In order to support program/project activities through continuous improvement, performance and status measurements are necessary for all product (and, if applicable, product components) configuration information and processes. Without measurements in place it is impossible to account for the status of the configuration and associated realization and/or sustainment activities.

Status lets one know where one is in the process while performance measurements communicate how efficiently and effectively activities are being performed. Configuration Status Accounting (see [5.4](#)) and the opportunity it provides for communicating product information is impossible if measurements are not in place.

Status metrics and performance data from CM Processes are critical for establishing and maintaining consistent execution and incontrovertible information used to communicate Configuration Status Accounting. It is important to develop performance, quality and quantitative measures (metrics) for use in evaluating the effectiveness of enterprise and supplier CM processes, procedures, and tools. Metrics are selected as appropriate for the program environment and product's life cycle phase. The information derived from the metrics is used to understand problems and inefficiencies in the processes or tools, to assess the extent of those problems and inefficiencies, and to provide insight in making necessary corrections and improvements. CM metrics are discussed further in [5.4](#).

#### 5.1.5 Establish, Implement, and Maintain Procedures

***Principle CMP-5. CM Procedures document how each CM function is implemented to accomplish the intent of the CM planning.***

CM procedures provide the detailed how-to steps to implement the CM functions. Procedures should be unambiguous, succinct, and written at a level of detail that is commensurate with the intended use. As with planning, procedures may be applied to a range of products, or tailored for individual products. Procedures must be carefully evaluated to ensure that they are consistent with CM planning and kept as simple as possible. While CM Procedures are described and referenced in the CM Plan, they represent standalone information sets outside the plan.

#### 5.1.6 CM Training

***Principle CMP-6. Provide CM training to assure that individuals understand their responsibility, authority, accountability, and the procedures for performing CM.***

CM training provides an understanding of the fundamentals and principles of CM and the use of CM tools, procedures, and practices. CM training should be consistent with the training policies of the organization.

Training should be planned to address both performance of assigned CM tasks and cross-training to provide awareness of relationships and interactions with others having CM-related responsibilities. Personnel from many organizations within the enterprise and suppliers have CM roles to perform. Continuous on-the-job and formal CM training should be tailored to address needs based on the individual's position, experience level, and responsibility. For example, Design or System Engineers would need an overview of the CM functions, whereas an individual assigned to maintain a CSA database requires in-depth training on the status accounting tools being used by the enterprise.

Training is provided as needed to personnel as processes change, personal skills evolve, and new tools are introduced. In addition, experienced mentors aid the transition of new individuals into the CM discipline.

### 5.1.7 Assess Compliance and Effectiveness

***Principle CMP-7. Periodic assessment of the effectiveness of CM procedures and tools and of compliance with the Configuration Management plan maintains the health of the CM process.***

The Configuration Management process is reviewed to demonstrate compliance to, and effectiveness of documented CM plans, processes, procedures and tools, to ensure performance and to provide for continuous process improvement. These reviews are conducted as periodic assessments or when the need for an individual assessment is indicated by process metrics. Monitoring the health of the CM functions identifies improvement opportunities and ensures that problems are identified before they cause major impact to the program.

A CM assessment is accomplished by reviewing the implementation of each CM process. Reviewing CM processes and verifying their performance ensures CM processes and procedures exist, are adequately documented to address the applicable principles of this standard, and the execution of the process documentation is in compliance with the documented requirements. CM Process Verification in [5.5.1](#) provides additional information.

### 5.1.8 Supplier Configuration Management

***Principle CMP-8. Performing configuration management includes responsibility for the configuration management performance of the supply chain.***

Configuration management requirements appropriate to the product being acquired are passed down the supply chain, typically via purchase order or other subcontract agreement instrument. Tailoring CM requirements for the supply chain is a major CM planning activity. The flow down of CM requirements, including the requirement to monitor the acquirer's subcontractors and suppliers, provides an appropriate application of CM functions and principles to the entire supply chain.

The supply chain is monitored via governance defined by contract to include as appropriate:

- Data reviews - Typically include assessment of supplier plans, procedures, and product configuration information.
- Configuration change management participation - Typically includes the review of proposed changes to buyer approved or imposed product configuration information.
- Design reviews - Typically assess the supplier's progress and provide a level of confidence that the product, when developed, will meet its specified attributes.
- Product testing - Typically using results as positive or negative indicators that required attributes will, or will not be satisfied.
- Configuration audits (see [5.5.4](#)) - Typically used to verify that the required attributes have been achieved, the design of the product has been accurately documented, and the configuration identification marking on the products matches the documentation. CSA Reports (see [5.4.1](#)) are often used in an audit to verify that the product's approved configuration has the desired integrity and is a detailed extension of all that preceded it.
- CM surveillance - Typically oversight and reviews verifying the continuous application of supplier CM processes.

The level of CM governance and/or control exercised by the buyer on the supply chain ranges from none to total, depending on the nature of the product and the conditions of purchase.

### 5.1.9 Product Configuration Information Processes

***Principle CMP-9. Information processes, including collection and processing, controlling status, providing interoperability and exchange, and long-term preservation, are essential elements of effective CM planning and management.***

Subsections 5.1.9.1 through 5.1.9.4 discuss the planning for the application of the following processes to product configuration information:

- Data Collection and Information Processing
- Information Status Control
- Information Interoperability and Exchange
- Preservation of Information

#### 5.1.9.1 Plan for Data Collection and Information Processing

Data collection and information processing requirements guide the selection of the methods and enabling technology required to collect, manage, retain and provide access to product configuration information throughout the product's life cycle. Product data such as performance, interface, and design information; testing procedures and results; operational and maintenance procedures; delivered unit configurations; and as-maintained data, among many others, may be required. The data is collected from many sources or organizations including engineering, project management, manufacturing, quality assurance, support, customers, and users.

To ensure that the needed information is available, CM information requirements should be solicited from potential information users. Defined sources, depth, and scope of configuration management information and associated metadata to be collected guide the selection of tools for collection, storage, processing, and distribution.

#### 5.1.9.2 Plan for Information Status Control

To ensure effective control and use of product configuration information, the status of each piece of information must be established, recorded and disseminated. Information status levels reflect the approval and allowable uses of the information. Initial status levels are assigned by the creator of the information but once a document is approved by the approval authority a status level of released is achieved, allowing it to be distributed beyond the originating organization (see [5.2.5](#)).

#### 5.1.9.3 Plan for Information Interoperability and Exchange

Interoperability and exchange of CM information requires that the information be in a format that is understandable and transferable between the exchanging parties. To ensure that the CM-related information is controlled and usable, it must be appropriately identified, compatible, access controlled, and complete; and in an accessible and usable form for defined user environments.

The interoperability and exchange of CM information may be by physical media, electronic data exchange, web access, or other means. The process employed to provide access, sharing, or exchange is accomplished by mutual agreement between exchanging partners and accomplished by using appropriate enabling technology.

#### 5.1.9.4 Plan for Preservation of CM-Related Information

Product configuration information is often required beyond the life cycle of the technology used to create it. Accordingly, it is important to ensure continued usability of the product configuration information throughout the product's life cycle and, if necessary, beyond. Considerations include:

- **Product:** To determine what data must be retained and for how long, consider the life expectancy of the product as well as the applicable legal and regulatory requirements for retaining the product configuration information. This may be for a specified period after product disposal, or it may be indefinite.
- **Application and Format:** Plan to capture information about the technology (operating system and version, application software and version, and data format) used to create, store, retrieve, interpret, and accurately present the data in a human readable form and as applicable, in a modifiable form.
- **Technology and Data:** To ensure continued accessibility/readability/usability of the data, consider the expected life spans of the associated technologies and plan for an appropriate frequency of update of both the technology and, where necessary, the data.
- **Information Backup and Recovery:** Establish and maintain a plan for information backup and recovery in the event of a local disaster such as earthquake, flood or fire. Remote backup of data and information is essential in the case of data loss at the prime site.
- Also, refer to ANSI/GEIA-859 for more information.

#### 5.2 Configuration Identification

The configuration identification principles address the composition of configuration information, how each document, product, and unit or group of units of a product is uniquely identified (identifiers); how relationships are maintained in product structures; how elements of the configuration are verified and released; how the product configuration and components of it is/are baselined for change management; how interfaces are defined and managed; and how Configuration Items (CIs) are assigned/designated.

The configuration identification function results in:

- Traceable configurations realized through unique identification of products and product configuration information.
- Organized composition of the product and associated information.
- Verified and released product configuration information.
- Defined, documented and baselined product configurations.
- Managed interfaces between products.
- Configuration Items where CM governance and control is designated.
- Consistency between a product and the information about the product over the product's entire life cycle.

Failure to implement proper identification techniques puts the enterprise and its relationships with suppliers at risk and may result in traceability and security issues, significant errors, additional costs, and schedule delays both in the production and sustainment that will follow the product throughout its lifecycle. The time and money expended to restore proper identification of the product configuration is likely to far exceed that which would have been expended to manage the information correctly from the outset.

### 5.2.1 Configuration Identification throughout the Product Life Cycle

***Principle CI-1. Configuration identification is the basis from which the configuration of products is defined and verified; products and their product configuration information are labeled; changes are managed; and traceability is maintained throughout the product's life cycle.***

The purpose of Configuration Identification is to incrementally establish and maintain a definitive basis for management, control and status accounting for a product and associated configuration information as it evolves throughout its life cycle. The configuration identification process ensures that at each phase in the product's life cycle, there is a controlled set of product configuration information that can be used as a basis for the other configuration management activities (i.e., planning, change management, status accounting, verification and audit), or for developing new products, modifying existing products or components, buying products for operational use, or providing support for products and their components.

### 5.2.2 Product Configuration Information

***Principle CI-2. Product configuration information serves as the basis for development, production, operation and maintenance/support of the product.***

Product configuration information is the subset of product information that consists of product definition information and product operational information as illustrated in [Figure 4](#).

Product definition information is the result of system and design engineering, providing the technical basis for design, development, build, integration, verification, and change actions taken during all product life cycle phases. It describes a product's performance, functional, and physical attributes in such documents as specifications, requirements documents, and design information (drawings, part models, software design documents).

Product operational information is derived, in part, from the product definition information. Product operational information consists of procedures and technical information needed by operators and support personnel to operate, maintain and dispose of the product including operating procedures, security procedures, maintenance procedures, spare parts lists, and disposal methods. Product operational information may also include reports that identify product deficiencies discovered during operation, maintenance, repair, or overhaul of the product and data reports that may be the basis for requests for change that result in improved performance of the product (see [5.3](#)).

In [Figure 4](#), product build, test, and distribution information are shown overlapping the two domains because they are based on product definition information and contain elements of product operational information. For example:

- Product design definition is the foundation for product build information, which is a reference to product maintenance and overhaul information.
- Software build/installation/load information is used in both development and operation.
- Product test includes both development testing and operational testing.
- Product distribution information including such elements as delivery (e.g., physical shipping, electronic transfer, electronic storage media, etc.), deployment, and inventory control also depends upon the product definition.