TECHNICAL REPORT

GEIA-TB-0002	
Issued 2008-06	

System Configuration Management Implementation Template
(Oriented for a US Military Contract Environment)

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GEIA-TB-0002

TechAmerica Engineering Bulletin

System Configuration Management Implementation Template

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June 2008

TechAmerica
WHERE THE FUTURE BEGINS
THE ASSOCIATION OF COMPANIES DRIVING INNOVATION WORLDWIDE

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(Formulated under the cognizance of the TechAmerica G-33 Configuration/Data Management Committee.)

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TechAmerica

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Revision	Description of change	Date
-	Initial Release	June, 2008

Table of Contents

The contents of the Systems CM Implementation Template are internally self-organized in spreadsheet (table) format. The information contained therein does not reasonably lend itself to a detailed table of contents, and therefore one is not deemed necessary. See the template directly for the obvious organization of the information.

Acknowledgement

The GEIA G-33 Configuration/Data Management Committee sponsored a specialized, short-duration working group in June 2007 to address the subject of CM implementation aligned with the DoD's acquisition life cycle. The working group conceptualized, developed and finalized the document in accordance with the initiating charter. The working group quickly mobilized via in-person meetings in Denver and San Antonio in mid-to-late CY 2007; and via several teleconference collaboration phone calls to accomplish the approach and technical content reflected in this Bulletin.

Special acknowledgement goes to each of the following members of the working group:

Mr. Mitch Kaarlela	Lockheed Martin
Mr. Dwayne Hardy	DoD Systems Engineering Office
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Mr. Sherman Weatherspoon	IBM
Mr. Phil West	Raytheon

Foreword

This Government Electronics & Information Technology Association (GEIA) Bulletin was prepared by a specialized working group of industry and government Configuration Management (CM) practitioners under the sponsorship of the G-33 Configuration/Data Management Committee. The working group was chartered to accomplish a short-duration task and document the results in a simple-to-understand format. See the System CM Implementation Template contained herein for those results. The actual spreadsheet is attached hereto, if any of the native data in the included table is needed for other reasons.

Important Notice Regarding Future Updates!

The working group acknowledges in advance that additional relevant input and guidance will be thought-of, discovered, identified or otherwise determined while this bulletin is in its first formal ballot review and continuing for at least a couple of years after it is first published. In other words, when advancing the state-of-the-art in an area such as this, the first iteration will by no means be the last word on the subject. The working group plans to batch process suggestions received between publishing dates, and consider reopening an update to the bulletin approximately once per year for the first two (2) years, and then plan to address suggestions and comments thereafter on an as-needed basis. Your comments and suggestions are welcomed, but please recognize our need to batch process them to best use our limited personnel resources.

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Introduction

The ITAA System CM Implementation Template working group's mission is to address the need to bridge the "how" of Configuration Management (CM) defined in EIA-STD-649 and other relevant CM standards, with the "when" of the US DoDI-5000 series Acquisition milestones and reviews; thus achieving a sequential, time-phased CM implementation template. The template is envisioned to be used by Industry to train new CM practitioners on what CM things to do in what order, and by Government personnel to assess individual program CM achievement compared to an Industry-agreed upon time-phased template. Think of this template as another "tool" in the CM practitioner's toolbox. The format of the resulting template naturally transitioned to a table to most efficiently convey the information. A listing of the acronyms used is provided.

The information conveyed by the Bulletin is provided for **GUIDANCE**. It is organized by the DoDI 5000 series acquisition phases of Concept Refinement, Technology Development, System Development & Demonstration, Production and Operation & Support; and in some cases specifically lists acquisition milestones such as SDD Contract Award. The order of the information should be understood to be Top-Down in sequence, with not every activity applicable to every contract or situation depicted.

*Note: This first iteration is **focused on a US military contract environment**, with subsequent updates to consider adding detail appropriate for commercial, other US government (NASA or FAA) and/or other functional areas (e.g., Data Management and Systems Engineering).*

What is Configuration Management?

Configuration Management (CM) is a process for establishing, controlling and maintaining consistency of a product's functional, performance, and physical attributes; with its requirements, design and operational information throughout the product's life cycle.

A primary objective of CM is to assure that a product performs as intended; and its physical attributes are adequately identified and documented to a level of detail sufficient to repeatably produce the product, and meet anticipated needs for operation, quality management, maintenance, repair, and replacement. The CM process explicitly facilitates orderly management of product change (e.g., extend capability, improve performance/reliability/ maintainability, extend service life, reduce cost, and correct defects). CM also involves the recording and reporting of configuration information to assist in the support and maintenance of delivered products. The relative cost of implementing CM is normally offset many times over in cost avoidance.

See EIA-STD-649A and its Handbook for more details on CM.

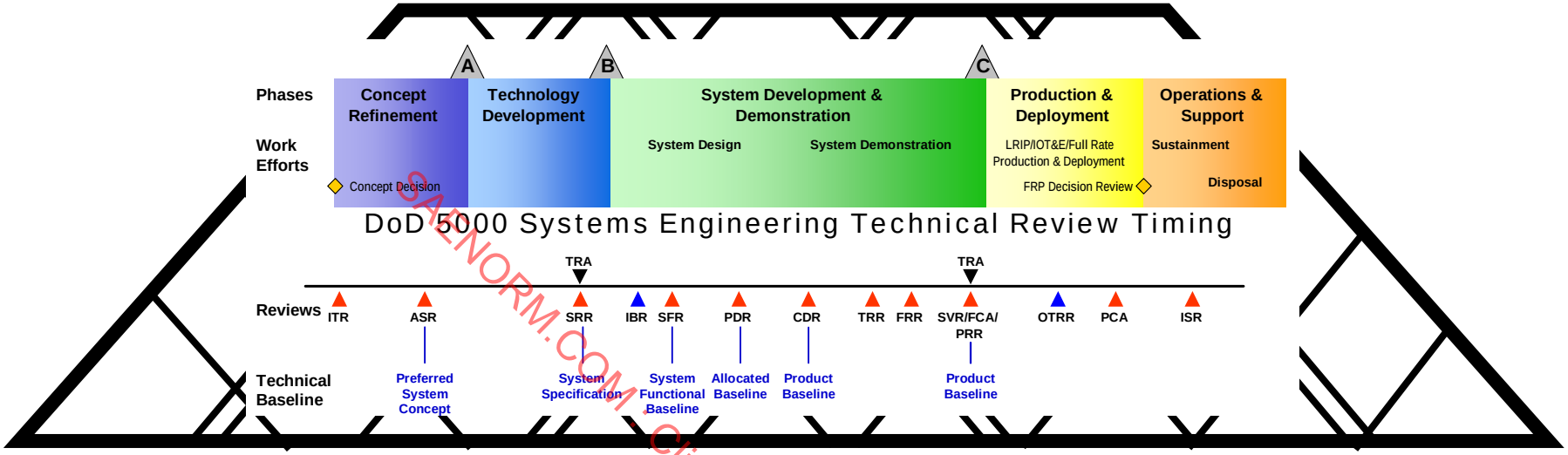
How to Use this Document

This Bulletin is initially intended to be used to convey a combination of information to CM practitioners, both new and already skilled personnel alike. It provides the "what" of CM products and activities; with the "when" of CM correlated to DoD acquisition phases and milestones – thereby giving a time-phased depiction. The document spreadsheet should be read from top to bottom. It shows both the CM activities and products that should be performed and accomplished on a program or project. Next it provides a brief description of the CM activity or product and a column providing a reference(s) to other sources of information to learn even more about how the activity or product should be accomplished. Also included is a column for suggested level of CM control to be applied to the activity/product, from an Industry perspective.

Future iterations will include a more complete dataset covering columns for entry criteria, exit criteria and related products from other skillcodes/disciplines. This Bulletin also has future considerations for a couple of specific examples regarding how to use the document (i.e., a day in the life), from start to finish, assuming different CM user skill levels are involved.

Pictorial Diagram

This Bulletin is intended to "bridge" the CM standards and the DoD Acquisition milestones & reviews. The diagram on the following page shows this conceptually.



System CM Implementation Template

CM Artifacts, Activities and Processes
(EIA-STD-649A + Handbook)

CM Data Objects
(EIA-STD-836A)

Technical Reviews & Audits
(Defense Acq Guidebook)

Gov't CM Tasks and Oversight

The Bridge Diagram

System CM Implementation Template

	DoDI 5000 Acq Phase or Specific Milestone	Closest or Most-Relevant Program or Tech Review	CM Product(s) & Activities	Product / Activity Description	Ref. Source Data	Level of CM Control
2	**Concept Refinement Phase** (concludes with Milestone A)					
3	Concept Refinement Phase	ITR	**None, CM provides "advice only"**	During this conceptual phase, the program might generate technical documentation that should be under "engineering" level of control - not formal CM Release control. It is anticipated that CM will have some initial planning during the TD phase for a program leading into a SDD phase. This might include: anticipated CM headcount, software tools to be used, special security considerations, ITAR & export control, CM training, multi-site issues or partners, re-review on company policies, etc.	MIL-HDBK-61A Section 4.3.1 and Table 4-1	
4	**Technology Development Phase** (concludes with Milestone B)					
5	Technology Development Phase	ASR	**Draft CI/CSCI List with SDD Proposal**	Program listing of the key hardware and software elements required to provide discrete end use functions comprising the Top-Level System (e.g., Weapon System), and designated for special Systems Engineering treatment (including areas of CM, Requirements Mgmt, Specification approval & verification, FAI, et al.). Listing provides a level and degree of work "scoping" for designers, systems integrators, buyers, testers and CM'ers. Categories that typically require parts/items to be designated as CIs/CSCIs include: state-of-the-art technology items, high unit cost items, special or classified technology items, technically complex or high technical risk items, time change items, safety-flight critical items, etc. This version is a "best available" DRAFT based upon the Contractor's understanding of the design approach being offered for the upcoming SDD Proposal (which is prepared in TD). This version is caveated as DRAFT and is subject to change. Make sure all internal and external reviewers acknowledge the caveat of DRAFT.	MIL-HDBK-61A Sect 5.1	Author control
6	Technology Development Phase	ASR	**Baselined Tech Req'ts Document (high level only)**	The program's technical requirements should be understood, captured, baselined, and traced to completion. A good practice is to identify each requirement with a unique requirement tracking identifier to facilitate unambiguous identification of each requirement. The source of the program requirements may vary depending on the type of contract or program and who the program's customer is (Government, commercial, etc). Typical sources for technical requirements are the: Contract, Technical Specifications, Special Contract Clauses, Special Customer Requirements documents, etc.	MIL-STD-961 plus Industry Std on Req'ts Mgmt?	CCB + Customer control

System CM Implementation Template

	DoDI 5000 Acq Phase or Specific Milestone	Closest or Most-Relevant Program or Tech Review	CM Product(s) & Activities	Product / Activity Description	Ref. Source Data	Level of CM Control
7	Technology Development Phase	ASR	**Draft CM Plan**	An important Program Management plan to address implementation and application of Configuration Management (CM). CM, applied over the life cycle of a product, provides visibility and control of its performance, functional, and physical attributes. CM verifies that a product performs as intended, and is identified and documented in sufficient detail to support its projected life cycle (e.g., fabrication or production, operation, maintenance, repair, replacement, and disposal). Include coverage for each of the recognized sub-disciplines of CM: CM Planning & Mgmt, Config Identification, CM Change Mgmt, Config Audits/Reviews/Surv, Config Status Acct, Supplier CM and Software CM. This version is a "best available" DRAFT based upon the Contractor's understanding of the design approach being offered for the upcoming SDD Proposal (which is prepared in TD). This version is caveated as DRAFT and is subject to change. Make sure all internal and external reviewers acknowledge the caveat of DRAFT.	EIA-HDBK-649 Section 5.1 MIL-HDBK-61A App A plus NAVAIRINST 4130.1D and MIL-STD-973 App. A	Author + Supervisor control
8	Technology Development Phase	ASR	**Update Draft CI/CSCI List to Refine Quantity**	Explain to the Design Teams the criteria that constitute a CI/CSCI (e.g., state-of-the-art technology, high per unit cost, special or classified technology, technically complex or high technical risk, time change item, safety-flight critical item, WBS item, etc.). Explain to the Design Team the importance of not having too many or too few CIs/CSCIs (must have balance). Based upon best-available system design understanding, prepare a rough estimate of the total CIs/CSCIs that should be required for successful achievement of the program.	MIL-HDBK-61A Sect 5.1; for WBS see MIL-HDBK-881	Author control
9	Technology Development Phase	ASR	**CM Tool & Training Roll-Out**	Review, examine and consider the CM tools already in-use by the company, program (project), team or partners. Coordinate with internal Information Technology (IT) rep's to determine if better off-the-shelf CM tools are available on the market. Consider arranging the program CM tools to allow sharing of CM information, via CM Data Exchange parameters, with Customer(s), subcontractors, suppliers, vendors and other partners; in an Integrated Data Environment (IDE). Document the CM tools to be used in the CM Plan, describe how the CM tools will be integrated and the CM data exchange methodology to be used.	See EIA-STD-836A for CM Data Exchange No Industry Std on CM tool usage, consult Industry CM Tool Sales Rep's for features & descriptions	Not Applicable

System CM Implementation Template

	DoDI 5000 Acq Phase or Specific Milestone	Closest or Most-Relevant Program or Tech Review	CM Product(s) & Activities	Product / Activity Description	Ref. Source Data	Level of CM Control
10	Technology Development Phase	ASR	**Draft FCA/PCA Plan**	Program Management plan to address the application of Functional Configuration Audit (FCA) and Physical Configuration Audit (PCA) activities on the program parts/items designated as CIs/CSCIs. FCA/PCA actions involve verifying that the functional and physical requirements have been met via approved verification methods. Successful accomplishment of this activity typically establishes the functional and physical baselines, respectively. If stand-alone FCA/PCA plan is not appropriate this early in life cycle, then include the basic strategy & concepts in the CM Plan for now and separate out when starting SDD. This version is a "best available" DRAFT based upon the Contractor's understanding of the design approach being offered for the upcoming SDD Proposal (which is prepared in TD). This version is caveated as DRAFT and is subject to change. Make sure all internal and external reviewers acknowledge the caveat of DRAFT.	MIL-STD-1521 Sections 3.7; 3.8; App's G & H and MIL-STD-973 Section 5.6.2 & 5.6.3 NAVAIRINST 4130.1D & 4355.19C Also ref Audit Plan Data Instruction - DI-SESS-81646	Author + Supervisor control
11	Technology Development Phase	SRR	**Final Supplier CM Req'ts Doc for Supplier Purchase Orders**	The Supplier CM requirements must be established & bilaterally agreed-upon before estimating the upcoming SDD proposal and the Supplier costs that go in it. Update CM Supplier requirements doc to reflect any last-minute changes from Prime-Supplier negotiations. Be sure to take into account all Supplier Data Items and expectations. Changes to Supplier CM requirements after this point; require formal proposal, analysis, coordination, change board disposition and negotiation/Purchase Order (PO) update.	EIA-HDBK-649 Annex 7	Higher Tier CCB control
12	Technology Development Phase	SRR	**Estimate CM Labor Req'd - Set CM Budget**	During a proposal effort for either this TD phase -- but certainly in the planning for a SDD contract -- the CM team must perform a thorough review of the contractual requirements for CM and for internal best practices to scope and estimate the budget needed by the CM team. Consider the CM labor categories, CM knowledge, CM skills & abilities required for the CM personnel.	EIA-STD-649A, Principle 1-1; EIA-HDBK-649 Section 5.1.3; MIL-HDBK-61A, Paragraph 4.3.1	Author + Supervisor control
13	Technology Development Phase	SRR	**Draft Part/Doc Number Schema**	CM, in concert with program (project) Systems Engineering and Data Architecture, will produce a draft product identification plan for CI/CSCI's, documents, drawings and digital data files for a program. Try to avoid building-in intelligence (significant numbering) in the part/document numbering schemes. The selected scheme should be based upon established organizational policy & procedure.	MIL-HDBK-61A Section 5.6	Author control

System CM Implementation Template

	DoDI 5000 Acq Phase or Specific Milestone	Closest or Most-Relevant Program or Tech Review	CM Product(s) & Activities	Product / Activity Description	Ref. Source Data	Level of CM Control
14	Technology Development Phase	SRR	**Functional System Specification**	Monitor that the program addresses any need for a functional specification and/or functional baseline. Depending on the type of program or product, the functional system specification can be developed (or evolved) in multiple ways. In programs where there is no new or minimal technology development is involved, a functional system specification may be a pre-existing document that is included in the contract as a required document and furnished by the customer to the prime contractor. When the functional system specification is developed internally, various designs and ideas from the concept refinement phase are considered and in the end a clear set of functional requirements evolve into a completed specification that is brought under configuration control. A functional system specification itself is a formal document used to describe in detail the end item's intended capabilities, appearance, and interactions with users. A functional specification may also contain formal descriptions of user tasks, dependencies on other products, and usability criteria.	MIL STD 973 Section 5.3.5.1.1 and MIL-STD-961	CCB + Customer control
15	Technology Development Phase	SRR	**Monitor Req'ts Changes and Impact of Contract Scope**	If not otherwise managed by a dedicated Req'ts Mgmt function or group, CM should monitor the volatility of the contract requirements. This includes the volume and impact of proposed contract requirements changes to the contract scope (or attempts to change the contract scope without a req'ts change). Ensure that req'ts changes follow the program Config Change Mgmt System in the CM Plan. Remember that "Requirements Creep" (un-managed contract scope growth) has done more harm to healthy programs than almost any other single factor (can cause US Gov't intervention via Nunn-McCurdy breach or GAO audit).	Common sense item, no reference data available	
16	**System Development & Demonstration Phase** (concludes with Milestone C)					
17	System Development & Demonstration (SDD) Phase	SDD Contract Award	**Proposal CM Plan**	An important Program Management plan to address implementation and application of Configuration Management (CM). CM, applied over the life cycle of a product, provides visibility and control of its performance, functional, and physical attributes. CM verifies that a product performs as intended, and is identified and documented in sufficient detail to support its projected life cycle (e.g., fabrication or production, operation, maintenance, repair, replacement, and disposal). Include coverage for each of the recognized sub-disciplines of CM: CM Planning & Mgmt, Config Identification, CM Change Mgmt, Config Audits/Reviews/Surv, Config Status Acct, Supplier CM and Software CM. This is the version of the CM Plan (CMP) that was submitted with the SDD Proposal and is compliant with the Government CM Plan (if such a requirement exists), is typically the version that is officially established and baselined upon SDD Contract Award; unless some changes were made in SDD Contract negotiations after proposal submittal.	EIA-HDBK-649 Section 5.1 plus NAVAIRINST.4130.1D and MIL-STD-973 App. A; and IEEE-STD-828-1998 (for SW CM Plans)	CCB + Customer control

System CM Implementation Template

	DoDI 5000 Acq Phase or Specific Milestone	Closest or Most-Relevant Program or Tech Review	CM Product(s) & Activities	Product / Activity Description	Ref. Source Data	Level of CM Control
18	System Development & Demonstration (SDD) Phase	SDD Contract Award	**Implement Configuration Identification methodologies**	Early in the Development phase, each program (project) should implement Configuration Identification methods in accordance with the CM Plan, and consistent with organization policy & procedure. This assures unique identification of configuration items (CI's), whether hardware or software, and their associated documentation early enough to be utilized in the original releases of these items. Be sure to consider associated initiatives and requirements like item unique identification (IUID). Depending on the size, scope & product line; Config Ident considerations can include but are not limited to - product structure & hierarchy, nomenclature/type designator requirements (DD Form 61 "Request for Nomenclature"), serialization requirements, development and implementation of consistent document and product naming conventions, baseline descriptions, identification of spares, part numbering, software version numbering, re-identification or modification of existing products, data items and change control documents.	MIL-HDBK-61A, Section 5; EIA-STD-649A Section 5.2; EIA-HDBK-649 Section 5.2	Lower Tier Chg Bd control
19	System Development & Demonstration (SDD) Phase	SDD Contract Award	**Update the Draft CI/CSCI List**	Update the DRAFT CI/CSCI listings prepared in the Technology Development (TD) phase and used as part of the technical basis for bidding the SDD Contract. Actively check with Design Teams to re-affirm proper understanding of what criteria constitute a CI/CSCI - and check for design approach changes since SDD Proposal submittal and SDD Contract Award. Re-explain to the Design Teams the importance of not having too many or too few CIs/CSCIs (must have balance).	MIL-HDBK-61A Sect 5.1; and EIA-HDBK-649 Section 5.2	Lower Tier Chg Bd control
20	System Development & Demonstration (SDD) Phase	SDD Contract Award	**Supplier CM Surveillance Plan**	CM planning includes responsibility for flow-down and monitoring of the prime CM requirements to suppliers. CM should plan to perform and schedule CM surveillance on the suppliers to ensure that CM requirements continue to be met, and to find potential CM issues early (before they become large problems). Supplier CM requirements are typically imposed via a Purchase Order (PO) and supplier CM statement of work. The degree of CM surveillance performed will depend on the complexity of the product, the degree of design responsibility and the past performance (CM history) of the supplier. CM surveillance should be standardized as much as possible, a CM Surveillance checklist is typically helpful.	EIA-HDBK-649 & Standards-ANNEX	Author + Supervisor control

System CM Implementation Template

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21	System Development & Demonstration (SDD) Phase	SDD Contract Award	**Review plans for GFP/GFE**	Government Furnished Property (GFP) is property in the possession of, or directly acquired by, the Government and subsequently made available to the contractor (e.g., facilities, materials, special tooling, special test equipment, and agency-peculiar property). Government Furnished Equipment (GFE) is equipment used during asset's lifecycle that is not property of the PMO (e.g., machine tools, test equipment, furniture, vehicles, and accessory and auxiliary items). CM's role here is: (1) to be aware of the contractual requirements for handling GFP/GFE on the program or project, (2) determine what are the CM responsibilities within the contract req'ts (know the expectations also), (3) ensure a process is in-place to review and give comments to Gov't proposed changes (ECPs) to GFP/GFE within the contractor's control, and (4) address GFP handling intentions in the CM Plan (as appropriate). This GFP activity is a "secondary" CM task but is important.	MIL-HDBK-61A	Not Applicable
22	System Development & Demonstration (SDD) Phase	SDD Contract Award	**Command Media Hierarchy, Policy, & Procedures**	This is not always a standard CM job. Explanatory document that details the means by which the program (project) will provide written direction for processes, procedures, policy, etc. to program personnel. Typically provides the hierarchy of documentation (i.e., Contract is highest, Statutory, Program Directives next, Program Plans, Program Policy Statements, Program Procedures, Program Process Bulletins, etc.).	ISO-9001 or AS-9100; CMMI	Higher Tier CCB control
23	System Development & Demonstration (SDD) Phase	SDD Contract Award	**Program Tech Data Master Library & Vaulting**	After original release of official documents, drawings/3D models, and software; these items come under configuration control per the program CM Plan and are stored according to the program data management strategy (typically in electronic servers, vaults, libraries, etc.). CM typically is the control agent for the offiicial baselined items listings and for officially vaulted documentation. CM should regularly communicate the official status of baselined items and documentation to the rest of the program (project). CM should **CAUTION** design groups not to release product designs prematurely (especially due to schedule pressure), as once the original release has occurred, the Config Change Mgmt system engages. CM should monitor a "number of changes per original release" metric. A special Software Development & Control Library for vaulting, distributing and checking-out software has been found to be helpful for many organizations -- with CM typically being the control agent. If not controlled directly by CM personnel, then CM should provide oversight & audit that the task is properly done.	No Industry nor Military recognized reference source is known	Lower Tier Chg Bd control

System CM Implementation Template

	DoDI 5000 Acq Phase or Specific Milestone	Closest or Most-Relevant Program or Tech Review	CM Product(s) & Activities	Product / Activity Description	Ref. Source Data	Level of CM Control
24	System Development & Demonstration (SDD) Phase	SDD Contract Award	**Software (S/W) CM Tool & PDM System Setup for the Tool-set**	"CM tools are generally categorized into two types, System or Program Configuration Management and Software Configuration Management. A system CM tool should at least make provision for: • Security - assure Documents are safe from unauthorized access • Control - of Bills of Material, Baselines, As-Designed, As-Built, and As-Maintained configurations • Visibility- to Part Change History, Alternate/Substitute Parts, ""Where-Used"" information for Parts and Assemblies. An SCM tool should at least make provision for: • Revising source code • Revising releases • Creating and tracking issues • Accounting / record keeping • Archiving • Avoiding the simultaneous reader/writer problem (situation where multiple personnel checkout the same design artifact at the same time but propose different changes - thus a proposed change sequencing issue arises)	Contact CM Tool Vendors for more info	Not Applicable
25	System Development & Demonstration (SDD) Phase	SDD Contract Award	**Establish Initial Functional Baseline** *(with Top-Level or Weapon System Spec)*	The SDD Contract establishes the initial Functional Baseline. It is typically comprised of the Top-Level Requirements Specification - also referred to as a Weapon System Spec (other names = Air System, Sea System, Ground System or Contract System Spec) and may include a high-level Interface Control Document (ICD) identifying the End Item's interface to other end items in the battlespace or environment in which your SDD End Item will operate. This Top-Level Spec should be invoked directly in the contract and requires bilateral, formal approval prior to being changed by the Customer or Contractor. CM should ensure that the initial Functional Baseline is documented, and ensure that any proposed changes to it get approval from the program Configuration/Change Control Board (CCB) and the Customer (for final approval). CM should be wary and ever mindful of attempts to change the Top-Level Weapon System Spec (Functional Baseline) through informal channels, oral agreements, or any other non-contractual means --> this is referred to as requirements scope creep.	MIL-HDBK-61A, Para 5.5.1	CCB + Customer control

System CM Implementation Template

	DoDI 5000 Acq Phase or Specific Milestone	Closest or Most-Relevant Program or Tech Review	CM Product(s) & Activities	Product / Activity Description	Ref. Source Data	Level of CM Control
26	System Development & Demonstration (SDD) Phase	SDD Contract Award	**Establish Change Mgmt Boards & Change Forms** *(change forms may be hardcopy or electronic)*	The change management board(s) are intended to provide consistency to the initiation, review, disposition and implementation of proposed changes to the program's officially declared baselines. A change management board(s) should be in place no later than the establishment of the initial baseline. When more than one board, a program document or the CM Plan should spell out the authority level of each board, including who is the decision-maker (chair) with authority to commit program resources (time, schedule, budget, facilities, etc) within their purview. The operation of each board should fit within its delegation or chartering authority. The highest-level board should be chaired by the Program Manager, with membership from program functional activities and others depending on the nature of the change(s) under review. Change forms should be developed in accordance with program needs, customer requirements and levels of control. Boards that have formal Customer participation should have agreed-to Concept of Operations (ConOps) in-place to clearly articulate responsibilities and expecta	MIL-HDBK-61A; EIA-STD-649A; EIA-HDBK-649; NAVAIRINST 4130.1D	Higher Tier CCB control
27	System Development & Demonstration (SDD) Phase	IBR	**Process Proposed Changes (Internal & External)**	Assist in the preparation of and lead the processing of proposed changes (Internal Minor, Internal Major and External Major) per the approved CM Plan and utilizing the established change management forms and boards. External Major changes are called Engineering Change Proposals (ECPs) and may include proposed Specification Change Notices (SCNs), when dealing with the US Gov't and typically involve: a technical statement of work (SOW), a time-oriented schedule of events and a proposed price for implementation.	Program or Project CM Plan	CCB + Customer control
28	System Development & Demonstration (SDD) Phase	IBR	**"CM Roadshow" Briefings** *(can be done multiple times from SDD Phase onward)*	The CM Manager will often be called upon to "explain CM" to program personnel at a high or overview level. Preparation of a presentation that gives concise explanations as to what your program or project intends to put under configuration control through the release process; define which Configuration Items (CI's) are under Change Board Control, define the levels of change boards (if applicable), and define what baselines your program intends to use, when & how they will be formally established (e.g. initial baseline, product baseline, allocated baseline, functional baseline, requirements baseline, software baseline). Use this roadshow to help establish consistent terminology used throughout the program (or company).	Typically is an internal Mgmt request, must synthesize overall strategy from the CM Plan	Author + Supervisor control
29	System Development & Demonstration (SDD) Phase	IBR	**Update CM Plan to Final**	Update the CM Plan with latest info from Proposal, Negotiations, agreements from SRR or IBR, etc. Be sure to properly describe any changes since the last version of the CMP in the change log in the up-front section of the document. This is a best business practice, even if not required by contract. Once the CM Plan has been approved & finalized, distribute copies to all relevant stakeholders, both internal and external.	EIA-HDBK-649 Section 5.1 plus NAVAIRINST.4130.1D and MIL-STD-973 App. A; and IEEE-STD-828-1998 (for SW CM Plans)	CCB + Customer control

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30	System Development & Demonstration (SDD) Phase	IBR	**Prepare for CM Participation in Supplier Audits/Reviews**	CM should perform appropriate readiness activities (i.e., "homework") in preparation for supplier CM audits, reviews and surveillance. CM should consult with the applicable design group(s), obtain the official verison of the supplier product/performance specification, obtain the official supplier drawing(s), review recent supplier requests for variances (non-conformances), review recent Quality findings (if any) and discuss overall supplier performance to contract with the applicable Buyer. CM should do as much "desk analysis" as is appropriate for the supplier, based upon the Supplier's past CM track record and other past history factors. This up-front, pre-travel preparation helps significantly in reducing wasted time once at the audit, review or surveillance.	MIL-HDBK-61A Annex C Para C-3 "Supplier CM Market Analysis Questionnaire"	Not Applicable
31	System Development & Demonstration (SDD) Phase	IBR	**Review CM Process Approach with Customer**	Regardless of CM Plan status, CM should use the IBR activity to review the overall CM approach for the Development phase and the CM budget and schedule that support the approach. Use the CM Plan as an outline, and go over every aspect of the intended CM approach with the Customer, to ensure there is no misunderstanding regarding CM intentions and expectations for Development. If the provided CM budget & schedule (see next item) do not support the originally planned CM approach, as described in the CM Plan, then review the new reduced-scope CM approach and establish a schedule to revise the program (project) CM Plan to match.	Common sense item, no reference data available	Not Applicable
32	System Development & Demonstration (SDD) Phase	IBR	**Review CM Budget & Schedule with Customer**	CM should review the existing budget & schedule for the Development phase and make sure that it supports the CM process approach as documented in the previously approved CM Plan. If the CM budget & schedule do not support previous CM planning, then initiate a revision to the CM Plan. CM is responsible to keep the CM Plan in-sync with the applicable budget & schedule, and coordinate each step of the synchronization with the Customer. Once synchronized, keep the program Earned-Value Mgmt System (EVMS) up to date with CM accomplishment & spend status. CM should discuss basic CM approach risk & trade-offs with the Customer, also as a part of overall IBR.	DODI-5000.1 Ver. 5.2	Author + Supervisor control
33	System Development & Demonstration (SDD) Phase	IBR	**Final Part/Doc Number Schema**	If not already achieved via Draft Part/Doc Number Schema (Line 13), CM should finalize any remaining or open aspects related to the program (project) Product Identification Schema for CI/CSCI's, documents, drawings and digital data files to the Program CM Requirements document for baselining at a Program Level Board.	MIL-HDBK-61A Section 5.6	Lower Tier Chg Bd control
34	System Development & Demonstration (SDD) Phase	SFR	**Update Functional Baseline**	The FBL is typically established at SDD Contract Award. The CM practitioner should be involved in establishing configuration baselines, and may assist in some amount to define and/or update the configuration baselines. To support SFR, it is recommended that the Functional Baseline be reviewed and updated (as required) to reflect the latest program (project) position related to functional requirements.	MIL-HDBK-61A, Paragraph 5.5.1	CCB + Customer control
35	System Development & Demonstration (SDD) Phase	IBR	**Update FCA/PCA Plan**	Update FCA/PCA plan based upon final SDD Contract. Be sure to take into account any changes made to the CI/CSCI list, as those designated items typically require FCA/PCA and other special CM treatment.	MIL-STD-1521 Sections 3.7; 3.8; App's G & H and MIL-STD-973 Section 5.6.2 & 5.6.3	Higher Tier CCB control

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36	System Development & Demonstration (SDD) Phase	IBR	**Finalize CI/CSCI List**	Finalize the CI/CSCI Listing, based upon final SDD Contract, Design Team updates and any other Customer agreements coming from SRR or IBR. Update and designate the CI/CSCI listing as officially released and baselined. Publish the CI/CSCI listing to all program personnel for use in their associated program activities.	MIL-HDBK-61A Sect 5.1 and EIA-HDBK-649 Section 5.2	CCB + Customer control
37	System Development & Demonstration (SDD) Phase	PDR	**Establish Allocated Baseline**	After successful completion of SFR (for req'ts) and PDR (for conceptual design), the time is right to establish the Allocated Baseline. As its name implies, it is a further step in allocating (assigning) requirements from the Top-Level SDD Contract (aka, the Functional Baseline) down at least one or two levels from the End Item Requirements (aka, Top-Level System or Weapon System) to the System Level or Sub-System Level Requirements. This flow-down of requirements provides the basis or starting point for the design teams to begin their work. At a minimum, prepare a listing (by nomenclature, identity/revision level and date) of all program products, artifacts, documents, simulations, etc. that comprise the Allocated Baseline.	MIL-STD-973 Sections 3.3 & Section 5.3.4	CCB + Customer control
38	System Development & Demonstration (SDD) Phase	PDR	**Refresh CM Understanding of Product Definition Information**	Recommend that all hands-on CM personnel get a refresher training course on hardware drawing interpretation (ex. ASME Drawing Interpretation Online Course) and software design-VDD-Code-etc. interpretation every 5 years.	Training Class / ASME Website	Not Applicable
39	System Development & Demonstration (SDD) Phase	CDR	**Finalize the FCA/PCA Plan**	Finalize the FCA/PCA Plan, based upon final SDD Contract, Design Team updates and any other Customer agreements coming from SRR, SFR and/or IBR; and design release data from CDR. Update and designate the FCA/PCA Plan as officially released and baselined. Publish the FCA/PCA Plan to all program personnel for use in their associated program activities.	MIL-STD-1521 Sections 3.7; 3.8; App's G & H; and MIL-STD-973 Section 5.6.2 & 5.6.3	CCB + Customer control
40	System Development & Demonstration (SDD) Phase	CDR	**Prepare draft of Traceable Items List**	This is a list of items that will be traced individuallly by a serial number and includes UID items. Typically, this starts with the items designated already as CI's/CSCI's and adds other items that require item traceability. The Government may opt to require that specific serial numbers (or end item numbers like tail numbers or ship numbers) be affixed to Government-purchased CIs delivered by the contractor.	MIL-STD-973 Section 5.3.1	Author control
41	System Development & Demonstration (SDD) Phase	CDR	**Check with Design Teams for Changes to CI/CSCI List**	Actively check with Design Teams (once or twice a year) to ensure they have not changed, omitted or overlooked program products that should be identified as CIs/CSCIs per the agreed-upon criteria. Explain to the Design Teams the importance of not having too many or too few CIs/CSCIs (must have balance). Document any proposed changes to the baselined CI/CSCI listing on the appropriate change form and process to the appropriate change authority (person or change board) for disposition (approval/disapproval/deferral). Be aware of preceding changes to Req'ts Mgmt that drive associated changes to the CI/CSCI list.	MIL-HDBK-61A Sect 5.1 and EIA-HDBK-649 Section 5.1 & 5.2	Not Applicable
42	System Development & Demonstration (SDD) Phase	CDR	**Look at Change Process Metrics & adjust CM Budget (as req'd)**	Review the program CM metrics data (types & categories of change, volume of changes per time period, number of nonconformances, etc.) against what was planned and budgeted to accomplish and make adjustments to the CM budget (and possibly CM scope) accordingly.	MIL-HDBK-61A Sect 4.3.1 and Fig 4-4	Not Applicable

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43	System Development & Demonstration (SDD) Phase	SDD Contract Award thru FRP Contract Award & Subsequent Contracts	**Conduct Internal CM Process / Product Audit(s)** *(performed multiple times after the CM Process is established, from SDD onward)*	Objectively evaluate adherence of the configuration management process against its process description, standards, and procedures, and address non-compliance. This is not a one time action, but should be done as required. Process audit: Confirm compliance with applicable configuration management standards and procedures. Examples of activities reviewed include: establishing baselines, tracking and controlling changes, establishing and maintaining integrity of baselines. Product audit: Conduct audit to confirm that configuration management records and configuration items are complete, consistent, and accurate. Examples of work products reviewed include: archives of the baselines, change request database. (Source: CMMI® v 1.2). Obtain a checklist to make this task easier.	EIA-STD-649A Sect's 5.5.3 (process); 5.5.1 & 5.5.2 (product); ANSI/IEEE STD-1028 Sect 8 Audits (S/W process & product); IEEE STD-1042 Sect 3.4.3 Reviews (Software CM); EIA-HDBK-649 Annex 4	Author + Supervisor control
44	System Development & Demonstration (SDD) Phase	CDR	**Perform Formal CM-controlled Software (S/W) build**	In coordination with the software team, generate an executable, testable, system from source code that is under CM control. This is generally created using build scripts prior to formal test and product release.	To be described in EIA-HDBK-649 Annex ? (to be released in Rev. A)	Lower Tier Chg Bd control
45	System Development & Demonstration (SDD) Phase	TRR	**Support Supplier or In-House FCA/PCA and Compile Subsystem FCA/PCA Minutes**	Documentation package(s) comprising the full record of each subsystem FCA/PCA activity. Includes planning notes, agendas/minutes of Dry Run meetings, agendas/minutes of formal meetings, action items, and any other related documentation.	MIL-STD-973 App G 70.5 & App H 80.5; and EIA-HDBK-649 App A 5.4.2	Author + Supervisor control
46	System Development & Demonstration (SDD) Phase	FCA	**Perform FCA and Compile FCA Minutes**	Documentation package(s) comprising the full record of the program FCA activities. Includes planning notes, agendas/minutes of Dry Run meetings, agendas/minutes of formal meetings, action items, and any other related documentation. CM should actively follow-up on all FCA action items.	MIL-STD-973 App G 70.5 & App H 80.5; and EIA-HDBK-649 App A 5.4.2	Author + Supervisor control
47	System Development & Demonstration (SDD) Phase	PRR	**Complete CM PRR Checklist**	The CM PRR checklist should be developed with input from Integrated Product Teams or other disciplines that interact with CM or use CM processes. The CM PRR checklist should be complete prior to a formal PRR, where a declaration of readiness may be required by the CM manager. The completed checklist provides the needed confirmation that processes, tools, personnel etc are in place and ready to support the production processes. At the completion of the CM PRR Checklist the CM Manager should be able to affirmatively state that the system product baseline has been established and documented to enable hardware fabrication and software coding.	Defense Acquisition Guidebook - Chapter 4.3.3.9.3. Production Readiness Review (PRR); MIL-STD-1521 Sect 3.10; AFSCR 84-2; NAVAIRINST 4355.19C	Author + Supervisor control

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48	System Development & Demonstration (SDD) Phase	FCA + PCA	**Monitor CM Metrics & Plan CM Budget for Production** *(this is an on-going activity to be performed from the start of the CM process throughout the program or project lifecycle)*	Throughout this phase and onward, the CM Group should be involved in collecting meaningful measures to analyze the efficiency and efficacy of the CM Process: Effort & funds expended for CM tasks (planned vs. actual), impact of changes on project cost & schedule, number of configuration audit action items, volume/numbers of CIs-CRs-ECNs (planned vs. actual and by status), number of Variances (non-conformances), Trouble Reports (by status). The CM Group may collect other performance measures to review CM performance: Age or cycle time of high priority CM Process forms/reports. Some Software CM Metrics might include: 1. Size Metrics - Lines of Code, Function Points 2. Complexity Metrics - Cyclomatic Complexity, Knots, Information Flow 3. Halstead's Product Metrics - Program Vocabulary, Program Length, Program Volume 4. Quality Metrics- Defect Metrics , Reliability Metrics, Maintainability Metrics	CM Process PR-CM-01 V1.1 EIA-STD-649A Sect 5.1.6; SW Metrics SEI Curriculum Module SEI-CM-12-1.1; EIA-HDBK-649 Sect 5.1.6 & Annex 2; IEEE STD-1044.1	Not Applicable
49	**Production & Deployment Phase**					
50	Production & Deployment Phase	PCA	**PCA Final Report**	Documentation package(s) comprising the full record of the program PCA activities. Includes planning notes, agendas/minutes of Dry Run meetings, agendas/minutes of formal meetings, action items, and any other related documentation. Do not forget to ensure that PCA was accomplished on a "production-representative" unit/article and was not a "gold-plated" unit. Part of PCAs objective should be to check that the processes and mechanisms are in-place (capability demonstrated) to be able to produce units at the planned production rate.	EIA-HDBK-649 Sect 5.5 & Annex 5 Sect 5.4.2; MIL-STD-1521 App H Sect 80; NAVAIRINST 4355.19C	Author + Supervisor control
51	Production & Deployment Phase	Completion of PCA	**Establish Product Baseline**	The approved documentation which completely describes the functional & physical characteristics of the product, including any interoperability characteristics and interfacing items. It consists of the complete set of released & approved engineering design documents (engineering models, engineering drawings & associated lists for hardware); and the software, interface and database design documents for software. It also includes by reference, the material & process spec's invoked by the engineering documentation. The Product Baseline prescribes: all necessary physical or form-fit-function-interface (F^3I) characteristics; the selected functional characteristics for production acceptance testing; the production acceptance test req'ts; and all allocated configuration documentation pertaining to the product/item, so that if the item were to be re-procured, the performance requirements for the item would also be included. The Product Baseline is the agreed-to technical departure point which serves as a basis for defining and managing proposed future change(s) to the product as it enters productio	MIL-HDBK-61A Sect. 5.5.1 and MIL-STD-973 Sect 3.74	CCB + Customer control