W H I T E P A P E R

CMII Versus Other Certification Programs

(Rev A)

Objective of This White Paper

Potential students often ask how CMII compares to other certification programs. This white paper serves to provide a comparison and an insight that would otherwise be difficult to sift out of the various web sites.

- *The Four Major Certification Programs*
- *Basic Similarities and Differences*
- *Traditional CM Practices Versus CMII Practices*
- *MIL-STD-973 and EIA-649A — Same Paradigm*
- *CMII: An Enterprise Approach to CM*
- *Certification Requirements and Cost Comparisons*
- *CM Experience Issues and Paradigms*
- *Examples of CM Paradigms and Needed Shifts*
- *Conclusions and Recommendations*

CMII Research Institute

Institute of Configuration Management

The Four Major Certification Programs

(1) Software Configuration Management **(SCM)** certification by the System Technology Institute **(STI)**.

- **SCM Specialist** — initiated in 1984

(2) Configuration and Data Management **(CDM)** certification by the National Defense Industry Association **(NDIA)** — previously known as the American Defense Preparedness Association **(ADPA)**.

- **CDM Manager** — initiated in 1990
- **CDM Specialist** — initiated in 1990

(3) Configuration Management **(CM)** certification by the Configuration Management Training Foundation **(CMTF)**.

- **Level 1** — initiated in 1993
- **Level 2** — initiated in 199?
- **Level 3** — initiated in 2007

(4) Configuration Management II **(CMII)** certification by the Institute of Configuration Management **(ICM)**, GfKM, ConfigOnline, Arizona State University, University of Tennessee and CMII Research Institute.

- **CMII Certified (CMIIC)** — initiated in 1986
- **CMII Professional (CMIIP)** — initiated in 2006

Basic Similarities and Differences

Programs **(1)**, **(2)** and **(3)** identify CM planning, identification, change control, status accounting and audits as the major activities of CM. This traditional approach to CM has its roots in the defense environment.

Program **(1)** focuses on software and is government-oriented. Program **(2)** focuses on the defense industry and mostly a U.S. market. Program **(3)** is defense-oriented and covers the U.S. and international markets.

Program **(4)** focuses on commercial, government, hardware and software applications in all markets and is very "how-to" oriented. CM is elevated out of engineering and given an enterprise-wide perspective. The scope of CM is expanded and its emphasis is shifted.

Traditional CM Practices Versus CMII Practices

CM Was Introduced in the Late 1960's to Solve the Inability of Defense Contractors to Build a 2nd Unit Identical to the 1st Unit.

CM Practices per Traditional CM

Resides in Engineering and Focuses on Design Requirements

Traditional CM

CM Planning:	***Apply CM if it can be justified (often called the graded approach):***
Configuration Identification:	***Define, document and baseline the product and its design attributes;***
Change Control:	***Control product changes and variances and maintain consistency;***
Status Accounting:	***Maintain current and historical versions of the product;***
Verification and Audit:	***Verify the design and confirm that the product conforms.***

• CM's goal is to maintain consistency between the product and its design;
• Accommodating change is seen to be incompatible with maintaining consistency;
• Variances (deviations/waivers) are acceptable for maintaining consistency;
• Ensuring that designs are clear, concise and valid is not an objective;
• CM is to be tailored for each application (do only that which is affordable).

Transition from Traditional CM to CMII

The CMII Term Was Adopted in 1988

CM Practices per CMII

Transforms CM into a Business Process Infrastructure to Manage All Requirements

CMII

Configuration Management:	***Ensures that configurations conform to released requirements;***
Requirements Management:	***Ensures that documented requirements are clear, concise and valid;***
Release Management:	***Ensures that documents are authorized and released prior to use;***
Change Management:	***Keeps released documents and data up to date;***
Data Management:	***Ensures data bases are accurate and deliverable data is secure;***
Records Management:	***Retains traceability of work and proof that work products conform;***
Document & Library Control:	***Protects knowledge assets and prevents unauthorized changes;***
Enabling Software Tools:	***Serve to enhance overall process reliability and efficiency.***

• Standardized process — does not require tailoring for each application;
• Accommodates change and keeps all requirements clear, concise and valid;
• Enables other activities to perform their tasks reliably and efficiently;
• Consistent conformance and continuous improvement are by-products.

MIL-STD-973 and EIA-649A — Same Paradigm

MIL-STD-973 "Configuration Management," released in 1992, was a consolidation of the 480-series of CM standards originally released in the 1968-1970 timeframe. MIL-STD-973 simply locked-in the traditional CM practices as described on page 3.

The MIL-STD-973 paradigm was also the basis for

- ISO 10007 "Guideline for CM" released in 1995;
- IEEE 828 "Software CM Plans" released in 1998.

The traditional approach to CM evolved in an environment where the government paid for the development of new weapon systems and took ownership of the designs which, in turn, were shared with other contractors. Data managers worked in conjunction with configuration managers to handle the huge volume of "deliverable data packages."

Many original problems, however, remained unresolved. As-delivered products rarely conformed to their designs. Contractors routinely changed products first and hoped the designs would catch up later. Rather than fix the slow, cumbersome and costly change process, deviations and waivers were used to record the variances.

Such ongoing problems were a major reason the Secretary of Defense issued an edict in 1994 to replace the military standards with "best commercial practices." For CM, that was interpreted to mean a "consensus standard" suitable for both commercial and defense environments.

The new standard, now known as EIA-649A "National Consensus Standard-Configuration Management," was written by the same authors.

MIL-STD-973 and EIA-649A (2004) now share the same paradigm:

- ***CM resides in engineering and focuses on design definition;***
- ***CM is identification/change control/status accounting/audit;***
- ***CM is to be tailored for each application;***
- ***CM's goal is consistency between the product and its design;***
- ***Variances (deviations/waivers) are used to maintain consistency.***

From a CMII perspective, nothing has changed. The problems that the Secretary of Defense had hoped to eliminate continue to flourish.

CMII: An Enterprise Approach to CM

CMII expands the scope of CM to include any information that could impact safety, security, quality, schedule, cost, profit or the environment.

CMII shifts the emphasis of CM and provides the how-to for:

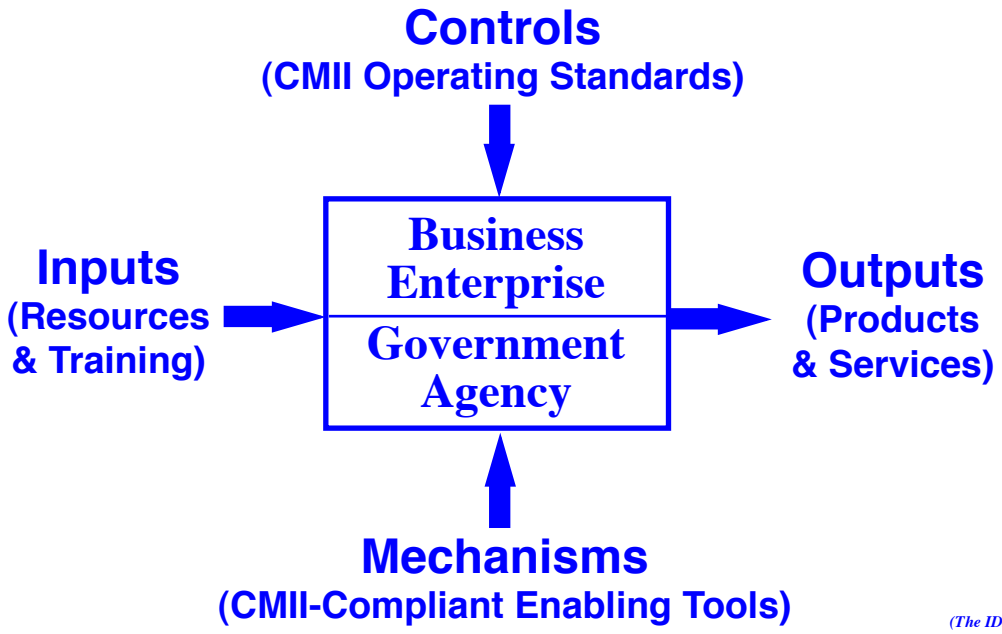
(1) accommodating change;
(2) optimizing the reuse of standards and best practices;
(3) ensuring that all requirements remain clear, concise and valid;
(4) communicating (1), (2) and (3) to users promptly and precisely;
(5) achieving conformance to requirements in each case.

CMII also promotes continuous improvement in (1) through (5).

The Bottom Line CM-Wise

An organization that cannot accommodate change and keep requirements clear, concise and valid has no choice but to operate in the corrective action mode. Highly inflated costs have always been a defense industry problem. Traditional CM does not enable any entity to escape the corrective action mode.

The best CM process is that which can best improve the ratio of output value relative to input costs.



(The IDEF Model)

Certification Requirements and Cost Comparisons

The chart on page 7 provides a detailed comparison of the SCM, CDM, CM and CMII certification programs.

Information contained in the chart was extracted from each training and certification provider's web site, as identified in the first column.

Column 1: Certification providers and web site addresses
Column 2: Required courses
Column 3: Required days in class
Column 4: Certification categories or levels
Column 5: Test hours
Column 6: Course and/or test fees (commercial and government rates)
Column 7: First year certifications were awarded
Column 8: Total number certified to date
Footnotes: Requirements for on-the-job experience

CM Experience Issues and Paradigms

Students registering for the CMII courses range from the rawest of rookies to the most seasoned old-pro's. Those with the most experience in traditional CM environments are typically most stuck in those paradigms. CMII instructors excel in helping them shift out of those paradigms. Examples of required paradigm shifts are provided on page 8.

As students move through the courses required for certification, ingrained habits begin to surface and paradigms begin to shift. Once the shift is complete, they can't wait to get back to work and apply the principles.

Conclusions and Recommendations

CMII provides the business process infrastructure that has been missing. It is an excellent enabler to further enhance other best practices such as ISO 9000, CMMI, Six Sigma, PMI and so on.

Any process wherein consistent conformance and continuous improvement are by-products, has universal application. CMII is the best option.

Comparison of SCM, CDM, CM and CMII Certification Programs

(1) SCM, CDM, CM & CMII Certification Providers	(2) Required (or Available) Courses	(3) Days in Class	(4) Certification Categories and/or Levels	(5) Test Hours	(6) Course and/or Test Fees		(7) First Year	(8) Number Certified to date
					Comm.	Gov't.		
STI (SCM) www.sti.com	SCM Impl. of SCM	4 4	SCM Specialist[1]	(take home)	$ 2,449 + 2,824	$ 2,265 + 2,640	1984	~ ?,000
NDIA (CDM) www.ndia.org	Prep course (if desired)	2	 CDM Manager[2] CDM Specialist[3]	 8 8	245 250 250	245 250 250	 1990 1990	both categories ~ 2,000
CMTF (CM) www.cmtf.com	Basic CM Advanced CM Software CM Enterprise CM	2 2 2 2	 Level 1 Cert. Level 2 Cert. Level 3 Cert.[4]	 3 2 1	1,295 + 1,415 + 1,415 + 1,415	1,195 + 1,295 + 1,295 + 1,295	 1993 199? 2007	levels 1 & 2 ~ 3,500 ?
ICM (CMII) www.icmhq.com www.gfkm.de www.configonline.co.za www.cmiiresearch.com	Course I Course II Course III Course IV Course V Course VI	2 2 2 2 2 2	 CMIIC (certified)	1 (included) 1 (included) 1 (included) 1 (included) 1 (included) 1 (included)	 6,000	 5,400	 1987	 ~ 6,000
	Course IX	3	CMIIP (professional)[5]	0	+ 1,050	+ 945	2006	~ 100

(1) SCM Specialist certification requires 4 consecutive years of SCM experience.

(2) CDM Manager certification requires 10 years of CDM experience.

(3) CDM Specialist certification requires 5 years of CDM experience.

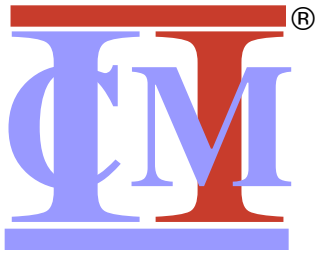
(4) Level 3 certification requires Level 1 and Level 2 certifications plus 4 years of CM experience or 3 years with academic credit.

(5) CMIIP certification requires CMIIC, a CM process assessment, attend refresher course, attend CMII conference, present a paper (repeat last 3 every 3 years).

~ NOTE: Totals, in some cases, were missing, unclear or confidential.

Examples of CM Paradigms and Needed Shifts

CM PARADIGMS	*CMII PRINCIPLES*
assuming life cycles begin and end with physical items.	*knowing life cycles begin and end with documented requirements.*
assuming the primary product of engineering is a prototype.	*knowing the primary product of engineering is documentation.*
assuming the purpose of a prototype is to prove the design works.	*knowing the purpose of a prototype is to validate the documentation.*
assuming changes to documentation are too slow and physical items must be changed first.	*knowing documentation should always lead and physical items must conform.*
assuming the impact of a few errors in each data set is insignificant and the effort to fix such errors would not be cost effective.	*knowing decreasing accuracy in data sets used in series causes the need for intervention resources to increase exponentially.*
assuming continuous corrective action is continuous improvement.	*knowing corrective actions are reactions to nonconformances.*
assuming the elimination of defects (and the need for waivers) is not economically feasible.	*knowing defects are caused by the process and defects can be eliminated by fixing the process.*
assuming the validity of any document is enhanced with each additional signature.	*knowing the integrity of lower level documents decreases as the number of signatures go beyond two.*
assuming computerization will solve most deficiencies in the document and change management process.	*knowing the process must be right before significant benefits from computerization can be realized.*
assuming each change will be the last change; any effort to improve the change process would be a waste.	*knowing an organization that continually "changes faster and documents better" will eventually win.*



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